YOUR

COMMODORE

AN ARGUS SPECIALIST PUBLICATION

FEBRUARY 1988 £1.20

WEOS—Window operating system



Fontmaster 128—Reviewed

Unbeatable Programs! — Screen Store 64 ▲ Relative File Programming

Amending C64 Basic ▲ C64 Morse Tutor

TOTAL BACKUP POWERT

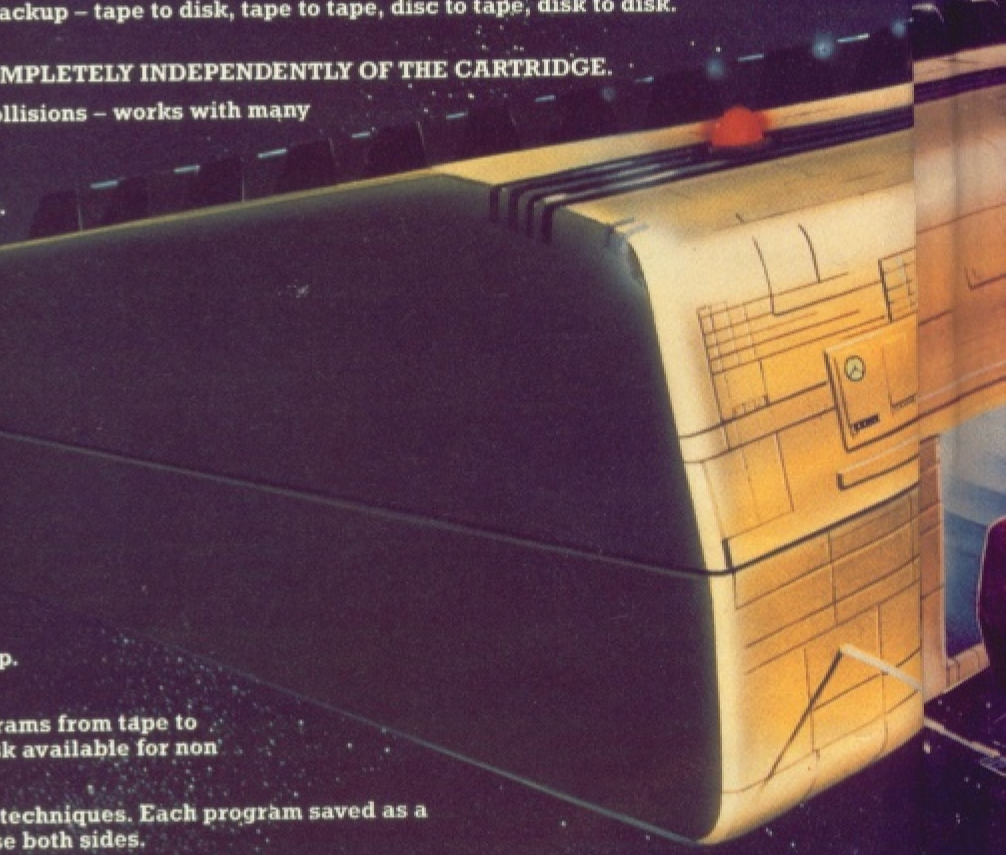
Now ACTION REPLAYM

NOW EVEN MORE POWERFUL, MORE FRIENDLY AND WIL BA

ONLY £29·99 POST FREE

Action Replay works by taking a *'SNAPSHOT'* of the program in memory so it doesn't matter how the program was loaded – from tape or disk – at normal or turbo speed.

- **WARP 25. THE WORLD'S FASTEST SERIAL DISK TURBO – NOW EVEN FASTER! LOADS 200 BLOCKS IN 6 SECONDS! 240 BLOCKS IN 7 SECONDS!** – that's even faster than some parallel systems. Built into the cartridge – no extra hardware or software required. Includes supercast, warpsave, scratch, filecopy/convert. Integrated with normal disk turbo for supercompatibility – auto detects warp or normal format so no special load commands are required. Turbo and Warp 25 speed are entirely independent of the cartridge with SUPERBOOT.
- **SIMPLE TO USE:** Just press the button and make a complete backup – tape to disk, tape to tape, disc to tape, disk to disk. THE PROCESS IS AUTOMATIC – JUST GIVE THE BACKUP A NAME.
- **TURBO RELOAD.** All backups will reload at turbo speed, COMPLETELY INDEPENDENTLY OF THE CARTRIDGE.
- **SPRITE KILLER.** Make yourself invincible. Disable sprite collisions – works with many programs.
- **PRINTER DUMP.** Freeze any game and print out the screen. Eg. loading picture, high score screen etc. Works with most printers. MPS 801, 803, Star, Epson etc. Double size, 16 shades, reverse print option. Very versatile – no user knowledge required.
- **PICTURE SAVE.** Save any Hires multicolour screen to disk at the push of a button. Compatible with Blazing Paddles, Koala, Artist 64, Image System etc.
- **SPRITE MONITOR.** Unique Sprite monitors allows you to freeze the action and view all the sprites, watch the sprite animation, save or delete any sprite. Load sprites from one game into another to make customised programs.
- **POKES/CHEAT MODE.** Press the button and enter those pokes for extra lives etc., then restart the program or make a backup. Ideal for custom games.
- **MULTISTAGE TRANSFER.** Even transfers multistage programs from tape to disk. The extra parts fast load – a unique feature. Enhancement disk available for non standard multi-loaders (see below).
- **SUPER COMPACTOR.** Ultra efficient program compaction techniques. Each program saved as a single file. 3 programs per disk side – 6 programs per disk, if you use both sides.
- **TEXT MODIFY.** Change title screens, high score screens etc. Put your own name into a game then restart it or make a backup to tape or disk. Very simple to use.
- **MONITOR.** Full feature 'Floating' type MACHINE CODE MONITOR. All standard features plus many more:- assemble, disassemble, hex dump, interpret, transfer, compare, fill, hunt, number conversion, bank switching, relocate, load/save etc. Uses no memory. Full printer support.
- **DISK MONITOR.** A special monitor for use on the RAM inside your disk drive. All the usual commands – a useful hacking tool.
- **WHOLE DISK COPY.** Copy a full unprotected disk in under two minutes with only one drive.
- **FAST FILE COPY.** Works with standard and Warp 25 files of up to 249 blocks. Converts formats to and from Warp 25.
- **FAST FORMAT.** Under 20 seconds.
- **TOOLKIT COMMANDS.** A whole range of useful new commands including: AUTO LINE NUMBERING, DELETE, MERGE, APPEND, OLD, LINESAVE, etc., PRINTERLISTER – list any program (including directory) directly from disk to printer or screen without corrupting memory.
- **REDEFINED FUNCTION KEYS.** Single stroke commands for operation of many common commands including: LOAD, SAVE, DIR. Load from directory – no need to type in filename.
- **TAPE TURBO.** Designed to make turbo load/save for your own programs. No screen blanking during loading.



REMEMBER all features are built in and available at the touch of a key. All features work with both **TAPE** and **DISK.** (Except multipart transfer & disk file utility).

ENHANCEMENT DISK

Contains routines for transferring many of the non-standard multi-load games from tape to disk. Over 40 titles. Latest additions are **LAST NINJA, ROAD RUNNER** (infinitive lives option), **BLOOD 'N' GUTS** (play any event), **DECEPTOR, LEADERBOARD EXEC** and **WORLD CLASS, KILLED UNTIL DEAD, MASK, INDIANA JONES, IMPLOSION, TAIPAN,** plus all the classics including **SUMMER GAMES, WORLD GAMES, DRAGONS LAIR** 1 and 2, **GAUNTLET, SUPERCYCLE** etc. Works in conjunction with **ACTION REPLAY.**

Disk includes **GRAPHIC SLIDESHOW** for displaying pictures saved with **ACTION REPLAY.** Plus Warp 25, Superboot – non Action Replay owners can speed up their 'expert' or 'freeze machine' programs to see what they have been missing.

ER TAKES A QUANTUM LEAP
Y MK IV HAS ARRIVED!

FOR CBM64/128

WILL BACKUP MORE PROGRAMS THAN ANY RIVAL UTILITY.

BUT THATS NOT ALL ... NOW AVAILABLE FOR THE SERIOUS PROGRAM HACKER

ACTION REPLAY IV 'PROFESSIONAL'™

● All the features of the normal Action Replay IV but with an amazing on board LSI LOGIC PROCESSING CHIP. Plus 32K operating system ROM and 8K RAM CHIP. The first RAM/ROM based cartridge of its type!



ALL THE MK IV FEATURES PLUS ...

● **FULLY INTEGRATED OPERATION.** The MK IV 'Professional' has all the features of the MK IV plus an onboard custom LSI LOGIC PROCESSING CHIP that integrates the whole range of utilities and makes them available at the press of a button at any time.

● **EXTENDED MONITOR.** The 'Professional' has an extra powerful machine code monitor. Because it has both ROM and RAM at its disposal the Professional can freeze any program and then examine the WHOLE OF COMPUTER MEMORY in its frozen state including screen RAM, ZERO PAGE and STACK.

Full feature disassembly, compare, fill, transfer, hunt, relocate, jump etc. etc. In fact all the features of the best fully blown monitor available. Return to the frozen program at the press of a key at the point you left it! An absolute must for the program hacker – or even the programmer who needs to de-bug his program.

● **INTELLIGENT HARDWARE.** The Professional hardware is unmatched anywhere in the world today. The special logic processing chip can cope with protection methods as they appear by reacting to its environment.

MK IV PROFESSIONAL ONLY £34·99 POST FREE

WARP 25 Reloads an average BACK-UP in 6 Seconds!!

UPGRADE INFORMATION

MK III TO MK IV. Just send £9.99 and we will send you the new MK IV Chip to plug into your cartridge. Fitting is very easy.

MK III TO MK IV 'PROFESSIONAL'. Send your old cartridge plus £19.99 and we will send you a new Professional MK IV.

MK 2 Action Replay owners can get £10 as part exchange against either the MK IV or Professional. Send old cartridge plus balance.

PERFORMANCE PROMISE

Action Replay will backup any program that any other cartridge can backup – and more! It also has an unmatched range of onboard features. Before you buy check our competitors ads to see what they offer and see how many of the Action Replay MK IV features are either not there or have to be loaded from Supergate disks etc. When you buy Action Replay if you don't find our claims to be true then return it within 14 days for a full refund.

ALL ORDERS NORMALLY DESPATCHED WITHIN 48 HRS

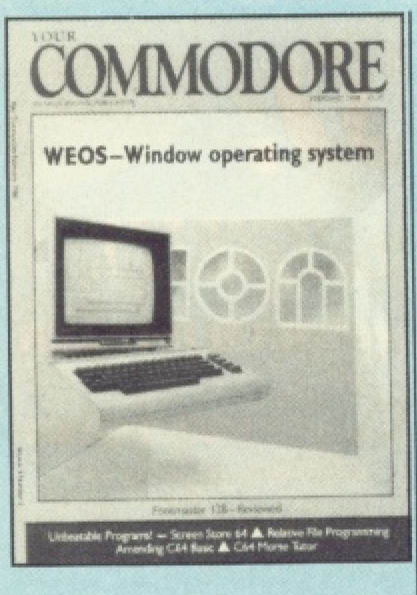
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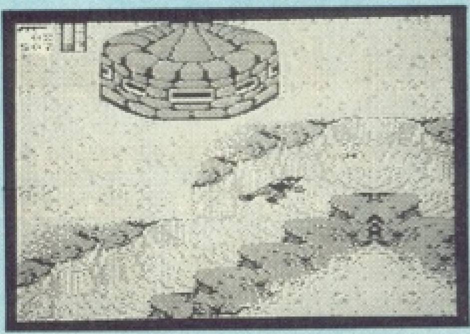
DATEL ELECTRONICS

UNITS 8/9, DEWSBURY ROAD, FENTON INDUSTRIAL ESTATE, FENTON, STOKE-ON-TRENT.

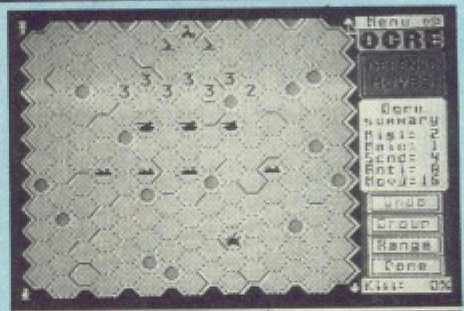
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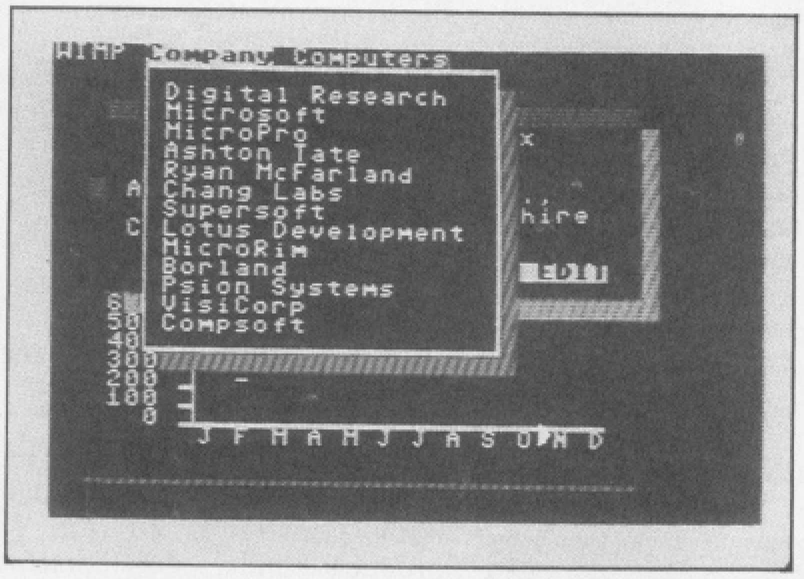


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FEATURES



GAMES AND UTILITIES

ARGUS PRESS GROUP

DON'T FORGET YOUR AMIGA

INSIDE NEXT MONTHS ISSUE

VOLUME 4
NUMBER 5

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DATA STATEMENTS

Commodore's Golden Girl

Tessa Sanderson's bid to retain her Olympic Gold Medal is being fully backed by her new sponsors Commodore Business Machines in a deal inspired by actor and ex-pop star Adam Faith.

Sanderson's success in the javelin event at the 1984 Olympics has led to several television appearances which she has squeezed in amongst her many sporting commitments. It was her role in promoting sports in schools that attracted Commodore's managing director, Steve Franklin, to consider the sponsorship move:

"We want to help Tessa in her efforts to retain the gold medal she won in Los Angeles and in return, hopefully, we shall benefit from the mass media coverage she attracts. In addition to this, Tessa does a lot with schools by promoting sports education. Schools, colleges and universities are very much a target area for us and Tessa will be helping us in our Roadshows which will visit UK educational establishments throughout the year."

When the Seoul Olympics appear on television later this year keep your eyes peeled for the Commodore logo which Tessa has promised to wear whenever she appears in public.

(l to r): Adam Faith, Seb Coe, Tessa Sanderson and Steve Franklin.





The Grand Slam Team (l to r) – Back Row: Tony Harvey, Elena Chivite, Peter Sleeman, Velda Hitchcock, Duncan Lowthian. Front row: Cathy Elliott, Stephen Hall, Andrew Noble, Becky Martin.

Good Buy APS

In a show of total confidence, Stephen Hall, Managing Director of Argus Press Software, has successfully concluded a management buy-out of the Company after several months of negotiations. The deal was clinched when Hall bought the whole of the issued share capital from its previous owners, the Argus Press Group.

As the new Chairman and Managing Director, Hall does not anticipate any great changes in the near future apart from a change of address from the Argus Press offices in Victory House and a change of company name to Grand Slam Entertainments.

The buy-out includes all of the APS assets and liabilities, including the back-catalogue, current stock, products under development and associated licences. The trading names Lothlorien, Mind Games and Grand Slam were also part of the deal.

Hall has bought the Company at a time when it has never looked stronger with products such as Red October and the arcade megahit Pacland poised for release.

Over the past 15 months there have been several additios to the staff at APS. Product Manager, Peter Sleemand joined Hall's team from Activision and Duncan Lowthian, Sales Manager, was previously with Microdealer. In an advisory capacity, Tony Kavanagh, ex-Gremlin Graphics, also lends his support and experience to the Sales Department as well as running his own company.

Despite the trials and tribulations of APS, accountant Andrew Noble has weathered the storms since 1985 and is duly awarded the extra responsibilities of Director and Company Secretary of Grand Slam Entertainments.

Last but not least is Cathy Elliott, Hall's Personal Assistant, who has the Herculean task of keeping the administration running smoothly.

As a part of the Argus Group, *Your Commodore* bids APS a fond farewell and wishes Grand Slam Entertainments every good fortune in the future.

Touchline:
Grand Slam Entertainments: *Victory House, Leicester Place, London WC2H 7NB.* ***Tel:*** *01-439 0666.*

DATA STATEMENTS

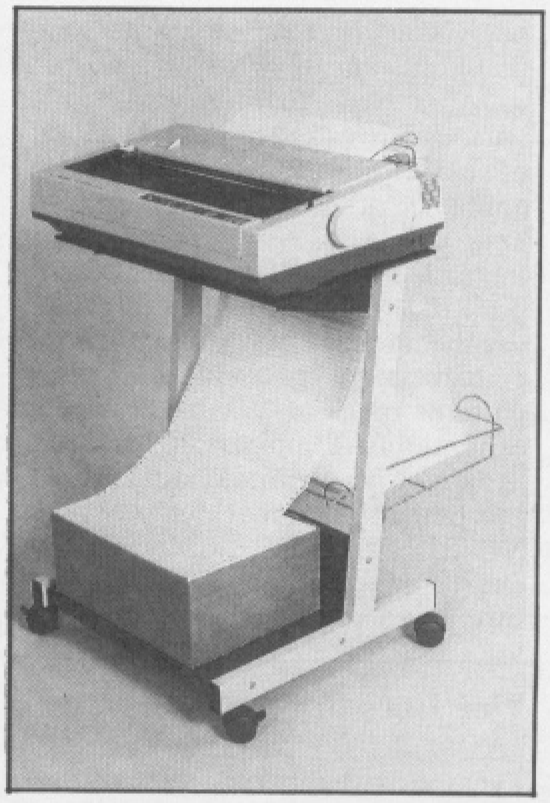
Stand and Deliver

If you have to move your printer from station to station, Bulldog Computer Services have the answer to your prayers in the form of a Mobile Printer Stand.

The unit is strong enough to take the kind of wear and tear that an office environment dishes out but the strength is tempered with lightness. The simple design features a split, one-size, steel top tray and non-slip antistatic rubber mats big enough to take either 80 or 132 column printers. Down below there is plenty of room for a stack of tractor-feed paper and a wire framed collection basket.

The units are finished in brown and sandstone with lockable forward castors. The price is £119 + VAT.

Touchline:
Bulldog Computer Services: *Winston House, 81-83 Wood Street, Earl Shilton, Leicester LE9 7NE.* ***Tel:*** *0455 44913.*



Bulldog's Mobile Printer Stand

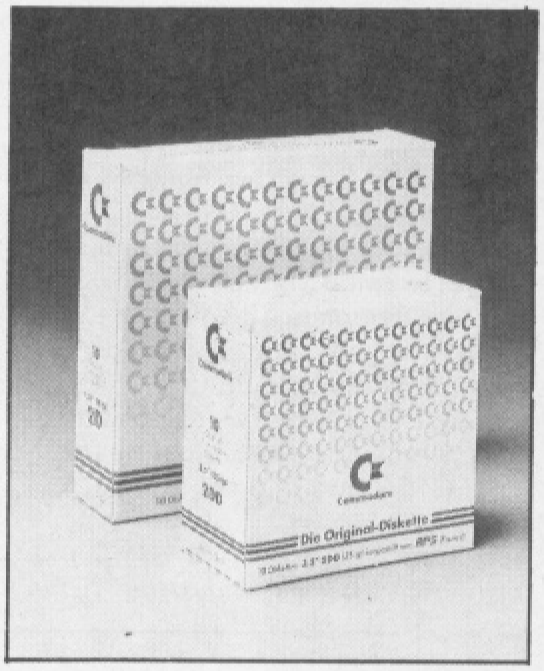
Focus on Germany

A West German order for 12 million of its 'High Focus' floppy disks has established RPS as market leader in the largest disk market in Europe – adding to an established reputation as a major force in the French, Italian, Belgian, Norwegian and Spanish markets.

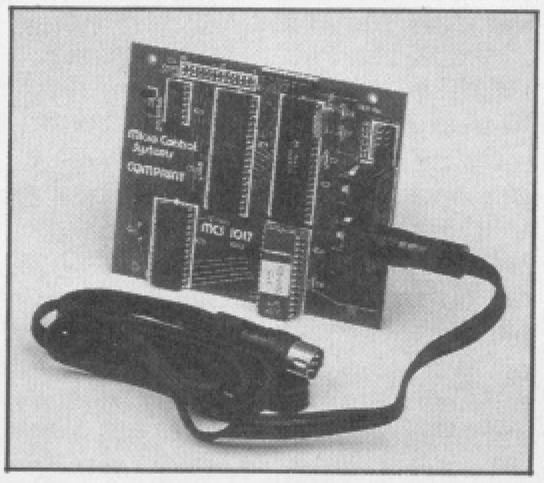
As holder of the marketing rights to the Commodore label in West Germany, RPS has signed the lucrative contract with disk wholesalers, Batavia. The deal was struck despite intense competition from German manufacturers but Batavia was especially looking for a supplier who would not be a competitor in the home market.

The 'High Focus' product range also accounts for 10% of the British market and RPS is keen to increase supplies from its factory based in Albi, France.

Touchline:
RPS: *High Street, Houghton Regis, Bedfordshire LU5 5QL.* ***Tel:*** *0582 867222.*
Commodore:*Commodore House, The Switchback, Gardner Road, Maidenhead, Berkshire SL6 7XA.* ***Tel:*** *0628 770088.*



The RPS/Commodore High Focus Range



The MCS Comprint buffer

Music to your Ears

Students studying for Music Grade Examinations 1-5 can practice for their aural tests with the aid of Aural, a musical program from Perfect Fourth Software.

Faithfully following the syllabus of the Associated Board of the Royal Schools of Music, the program is aimed at all serious instrumentalists or singers and includes a module which shows how to conduct in time to music. The program contains 250 tests, chosen at random, and eliminates the need to enlist the aid of a pianist to help you practice.

Perfect Fourth are taking great pains to underline the fact that this is not just another composer program. It has been designed to avoid the need for specialist computer skills and the specially commissioned fast loader from Trilogic enables as full memory load to take place in just over a minute from tape or 17 seconds from disk.

Touchline:
Perfect Fourth Software: *11 Hempstead Lane, Potten End, Berkahmpstead HP4 2QJ.* ***Tel:*** *04427 6311.*
Trilogic: *Unit 1, 253B New Works Road, Low Moor, Bradford BD12 0QP.* ***Tel:*** *0274 691115.*

The Missing Link?

The Comprint buffer interface from Micro Control Systems offers more than just an 8K buffer.

Connecting Commodore machines to non-CBM printers can be a headache but Comprint offers all of the necessary hardware to link the C64 and C128 to Canon and Epson printers. The device is easily installed inside the chosen printer and provides all the necessary connections for linking into the computer's serial port.

Once connected, Comprint will convert all of the Commodore's output into standard ASCII format and also allows access to the special features of the printer.

The prices are £34.99 for the 8K Epson unit and £44.99 for the Canon. Special reductions are on offer for the 2K buffer units and the new prices are £29.99 and £39.99 respectively.
Touchline:
Micro Control Systrems: *Electron House, Bridge Street, Sandiacre, Nottingham NG10 5BA.* ***Tel:*** *0602 391204.*

DATA STATEMENTS

The Big YC Binder Offer

At *Your Commodore* we've fallen victim to our own success. As the number of features and advertisements have increased over the past year, so has the number of pages been increased to cope with them. A few avid readers spent Christmas filing away their precious magazines and have pointed out that the *Your Commodore* binders no longer take a full year's magazines.

After pondering the problem for a few minutes, some bright spark at our Reader's Services Department came up with the perfect answer – make BIGGER binders! The miracle of the whole scheme is that they're still the same price and the same high quality but make sure that your order states that you want the 1987/88 size.

As a New Year Goodwill to All Persons move (and to shift the backlog of smaller binders!) we are pleased to announce a special bargain offer. As long as stocks last, we are offering three of the old style binders for the price of two – after all you can always use them to tastefully camouflage that embarrassing collection of knitting patterns or as an outsize Filofax for exhibitionist Yuppies. OK, yaah!

If you want to take advantage of this limited offer, mark your envelope YC BINDER OFFER, enclose your cheque or postal orders for £11.90 (for three binders) made payable to ASP Ltd and don't forget your name and address. Send your order to Readers' Services at the Touchline address at the end of this news item.

If you want the big binders mark your envelope YC 1987 BINDER and follow the instructions above remembering that each binder only costs £5.95.

Enjoy but please allow 28 days for delivery.

Touchline:
Your Commodore Readers' Services: *9 Hall Road, Maylands Wood Estate, Hemel Hempstead, Hertfordshire HP2 7BH.*

Gateway Changes

Readers wishing to contact the Gateway Computer Club should note the new address and phone number given in our Touchline. Gateway has a membership of over 150 computer users and organises events at the Bob Hope Recreation Centre, RAF Mildenhall, Suffolk on the third Sunday of every month. Specialist groups such as Commodore users have their own meetings at other times during the month.

The current membership fee is £7 pa and this entitles you to receive a monthly issue of the 20 page Gateway Gazette. Anyone who requires further information can drop a line to Phil Herberer at the Touchline address.

Touchline:
Gateway Computer Club: *164d Radcliffe Road, Lakenheath, Suffolk.* ***Tel:*** *Eriswell 2363.*

Vine Goes to Press

Tynesoft have recruited the services of leading sports' commentator, David Vine, to write the introduction to the booklet which accompanies the Winter Olympics '88 compendium.

Vine has been connected with the Winter Olympics for the past 20 years and his BBC programme, Ski Sunday, recently celebrated its tenth anniversary from the Winter Games location in Calgary.

Tynesoft are also inviting a lucky winner to enjoy a holiday for two at the Winter Olympics. All you have to do is to buy the game and place in order of importance eight qualities which are required of a No1 Ski-ing athlete.

The game is available now for the C64, C16/Plus4 and the Amiga.

Touchline:
Tynesoft: *Addison Industrial Estate, Blaydon upon Tyne, Tyne and Wear NE21 4TE.* ***Tel:*** *091-414 4611.*



David Vine – probably the most travelled commentator in the World.

Amiga News

New Amiga software and hardware is appearing daily. The user base over here is still not large enough to support any major British developments but the interest in acquiring British rights for American products is encouraging news.

The Amiga market is still growing and 1988 looks like being a good year if only something can be done about the price of the software.

The latest news from America is that the Scribble! wordprocessor, Analyze! spreadsheet and Organise! database have all been combined in a single package called The Works! As a business package, this forms an attractive starter kit.

Publisher Plus is an upgrade of Publisher 1000 which now includes Postscript laser printer support software and it is currently being sold at a lower price than its predecessor.

For business or leisure presentations, TV★Show from Zuna Group can help the Amiga owner to put together a sophisticated slide show or live video presentation. Over 40 different wipes can be used to phase one image out as another is phased in on a timed basis or remote control.

Write & File is the latest WYSIWIG wordprocessor with an integrated database, mail merge facility and spell checker. There is a wide range of fonts available in a variety of styles to give a professional look to your documents.

Further information on any of these products can be obtained from Brown-Wagh Publishing in California.

Touchline:

Brown-Wagh Publishing: *16795 Lark Avenue, Suite 210, Los Gatos, CA 95030, USA.* ***Tel:*** *0101-408 395 5602.*

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"Very easy to use — probably the friendliest package I have come across."
— Commodore User

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Superscript 64 .... ~~£60.95~~ £49.95
Superbase 64/+4 .... ~~£90.95~~ £39.95
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Superscript 128 .... ~~£89.95~~ £74.95
Superbase 128 .... ~~£99.95~~ £59.95
Superscript 128 & Superbase 128 .... ~~£189.90~~ £119.95
Superbase, The Book £11.95

GEOS Version 1.3
CBM 64/128 Operating System
Including: Desktop, Geowrite, Geopaint, and Desk Accessories, Disc
CBM64 .... £26.95
CBM128 .... £34.95

GEODEX/DESKPACK
Combined Database with powerful Mailmerge function. Also contains Artgrabber Graphic Images, Calendar and Icon Editor £21.95

GEOCALC
Geos-based Spreadsheet £24.95

AMIGA RANGE

AMIGA A500/CBM MONITOR OFFER
AMIGA A500 with **COMMODORE 1081 HIGH RES COLOUR MONITOR**, Mouse, Workbench, Basic and DPAINT Software £749.95

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with Mouse, Workbench, Basic, DPAINT, TV Modulator, 40 Disc Storage Box, Dust Cover and 10 Games/Utility Discs £458.85

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with Mouse, Workbench, Basic, DPAINT, Sports Bag with Baseball, Golf and Football, 40 Disc Storage Box, Dust Cover and 10 Games/Utility Discs £458.85

AMIGA A500 PACK 3
with Mouse, Workbench, Basic and DPAINT Software £429.95

AMIGA 1Mb 2nd Drive £129.95

PHILIPS 8833 COLOUR MONITOR
High Res with Stereo Sound Output £279.95

AMIGA A2000 SYSTEM
AMIGA A2000 COMPUTER with **COMMODORE 1081 HIGH RES COLOUR MONITOR**
Including 1 year on-site maintenance . £1259.00

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Professional full-feature Wordprocessor. Integrates with Geopaint, etc. £21.95

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1541C DISC DRIVE £169.95
The above includes GEOS, plus either:
Software Pack A
6 Adventure Games plus 5 Disc Arcade Games;
Software Pack B
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High Quality Dot Matrix Printer
★ Near Letter Quality Mode ★ 120 cps Draft Print Mode
★ Friction and Tractor Feed ★ Needs no interface
★ Full Two-Year Warranty ★ 100% Commodore compatible
Commodore Version (with CBM64/128 Printer Lead) £169.95
Centronics Version (with Amiga Printer Lead) £174.95

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Software Pack B
Quick Brown Fox Wordprocessor, Easyfile Database, and Future Finance Planning Package

STAR NL10 Dot Matrix Printer
Commodore Version (with CBM64/128 Printer Lead) £219.95
Centronics Version (with Amiga Printer Lead) £224.95
Commodore 1901 Colour Monitor £219.95
Philips 64/128 Green Screen Monitor £89.95
Commodore 1541C Disc Drive £159.95

Philips Colour TV Tuner
For use with any composite monitor including 1701, 1801, 1901 & 8833 .... £78.95
Commodore DPS 1101 Daisy Wheel Printer £199.95

COMMODORE 560P
2-colour Dot Matrix Printer, takes 2¾in. roll paper .... ~~£49.95~~ £29.95

MPS803 TRACTOR FEED UNIT £29.95

CBM 64/128 MUSIC EXPANSION SYSTEM
Including Keyboard, Synthesiser and Software £75.00

COMPOSER/EDITOR SOFTWARE
For Music Expansion System, Tape or Disc £24.95

ACTION REPLAY Mk IV
Tape to Disc Back-up Cartridge £29.95

NEOS MOUSE
WITH CHEESE SOFTWARE, Tape or Disc £24.95

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Lightpen/Graphics Illustrator Package, Tape or Disc £24.95
"Powerful, well designed — a really sophisticated graphics package"
— Your Commodore

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DPS 1101 Multi Strike £3.50
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Hardware orders add £1.00 under £65.00 value, and £5.00 over £65.00 value.
Printer orders add £5.00 towards carriage.

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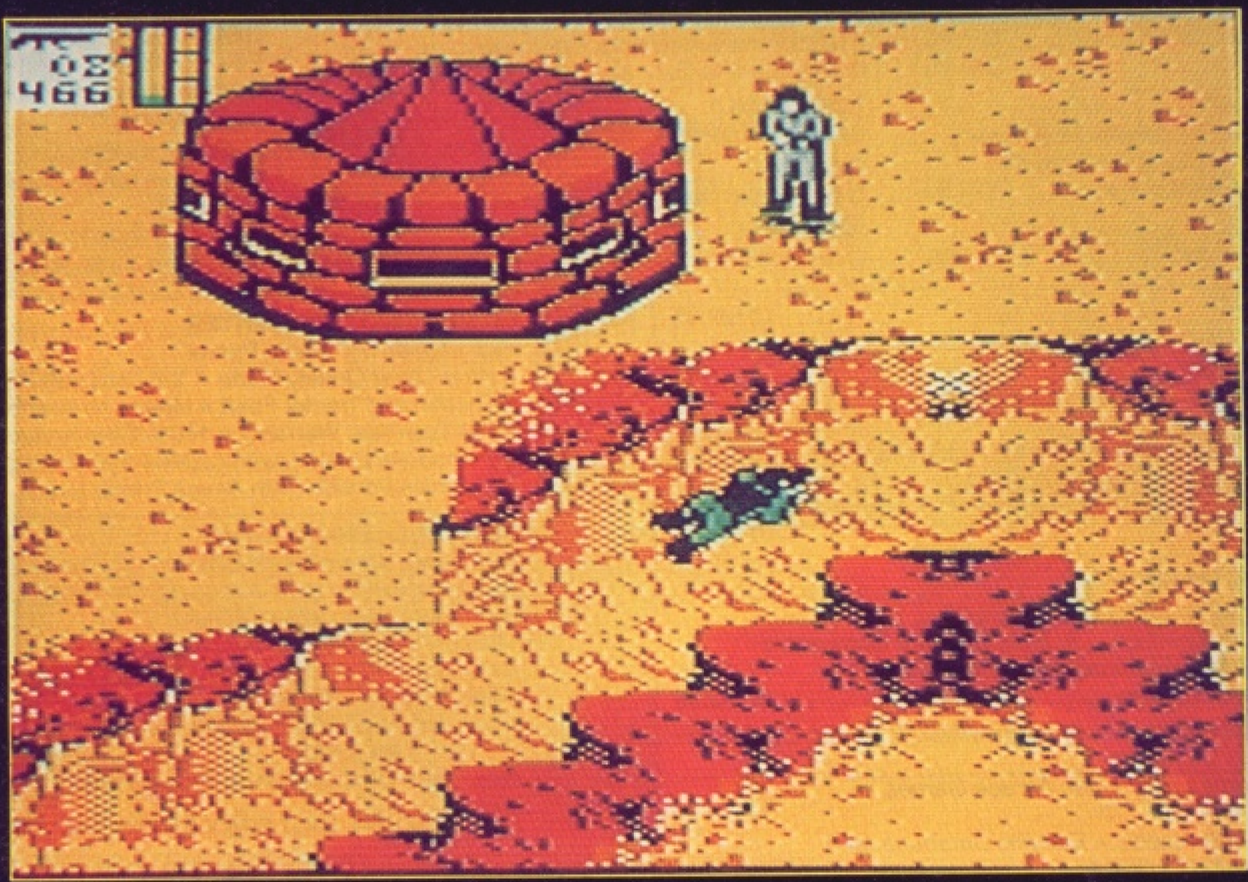
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Airborne Ranger

Here's your opportunity to get in on the action and become a Ranger in Microproses' new release

By Tony Hetherington



Whenever a bridge needs blowing, pipelines need cutting, plans need stealing or people need abducting the Americans call in their equivalent of the SAS – the Rangers. In the latest all action simulation from Microprose you are a Ranger, dropped behind enemy lines to take out enemy targets. There are in fact twelve missions that can be attempted in any order, or one after another in the campaign game.

The Airborne Ranger is sent on a variety of missions that can range from a diversion assault to a stealth attack where you musn't engage the enemy until the last minute. As with all other Microprose games you have to use your brain as well as your joystick or you'll be cut down in a few minutes.

You can practise each of the missions with any Ranger or create a character that's stored on disk until he's needed to do a job. As your skill increases and missions are completed your Ranger will be promoted from a lowly private to the giddy heights of Colonel heaped in battle honours such as Commendations medals and even the Congressional Medal of Honour! However, if you're killed in action so does the character and you must start again from Private.

Each mission begins with the deploy stage in which an



aeroplane flys over the target area and down to the bottom of the screen where it drops you by parachute into the game. This is a crucial part of the game as it not only gives you a first look at the enemy positions but also allows you to drop three bundles of supplies on your likely route.

These supplies contain ammunition for your carbine, shells for your rocket launcher, grenades and first aid kits. As carrying too much equipment slows you down, you must try and drop the supplies when and where you'll need them. Once the parachute opens and you descend to the ground you're on your own until you reach the pickup point which is right at the top of playing area. Ahead of you lies enemy soldiers, your target, machine gun sites, minefields, bunkers as well as hazards such as barbed wire, unsafe ice and proximity mines.

Your first job is to check your equipment and see that by pressing a single key you can swap from your standard carbine to a knife for silent stealth attacks, rockets to take out bunkers from a distance, grenades to hurl at machine gun nests, buildings or troublesome troops or select a time bomb that can be set with a 5, 10 or 15 second fuses.

These are particularly useful as you can set a bomb with a 15 second fuse as a diversion to draw away the guards from your intended target. Next you should check the map (this also pauses the game so you have time to pick out the information you need) and plan your route taking in account that it's unwise, not to mention unhealthy to walk infront of too many bunkers when you could crawl along inside trenches and escape their fire. You should also check where the enemy have laid mines and avoid them, as it's all



to easy to step on one and end your game and your career while in a fight with some enemy soliders.

When you have your route planned you're ready for action. You can move in Airborne Ranger in three different ways as you can walk, run or crawl close to the ground. Running is obviously the quickest way to travel but you quickly tire and must walk or crawl to regain your energy where as crawling is the safest particularly through the trenches and is the best way to creep up on an enemy. However you can't spend the entire mission on your belly as you'll miss the rendezvous at the pickup point. Whatever your mission or your style of attack you will find that you'll improve your chances of success if you plan ahead and devise tactics rather than the 'blast everything that moves' Rambo style of play. You will actually creep up on sentries and knife them before they can sound the alarm, you will dive into trenches to escape the fire from a bunker before you aim, jump up and fire then drop down as you take it out with a rocket.



Each mission presents you with a new challenge that will keep your reactions sharp and on target for success. I found the most difficult missions to be the ones in which you must reach the target area without firing a shot. Otherwise this will either put other rangers at risk in the mission in which you must disable a SAM site or give the enemy time to get their aircraft airborne giving you no chance to destroy them, or give them a chance to kill the hostages or prisoners before you can free them. In these missions you may only attack with your knife and use stealth as your main weapon to get around the patrols and bunkers. However once you're in the top third of the area you can let them have it.

Superb graphics and intelligent enemy forces put you in the thick of the action in desert, termperate and artic battlefields in a game that leaves other combate games firing blanks.

Touchline:
Title: *Airbourne Ranger.* ***Supplier:*** *Microprose, 2, Market Place, Tetbury, Glous. GL8 8DA.* ***Tel:*** *0666 54326.* ***Machine:*** *C64.* ***Price:*** *£1495 (Ca) £19.95 (D).*

Originality: *8/10.* ***Playability:*** *10/10.* ***Graphics.*** *10/10.* ***Value:*** *9/10.*

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Communications Corner

Greetings comms fans! For obvious reasons things start to happen in the comms world at this time of the year so there's plenty of news.

By David Janda

A massive expansion of MicroLink is promised after a £1.50 million deal was signed with Telecom Gold. Derek Meakin, managing director of Database Publications which runs the service told *Your Commodore,* "We'd been talking about such a deal on and off for the last two years, but only speeded things up when the possibility of the price increases, since becoming a reality for other Gold users, became apparent."

In the deal MicroLink gets its own Prime 9950 computer which is reputed to be four times more powerful than the Prime 750s which are used on the rest of Telecom Gold.

Database are not saying exactly what new features will be implemented, but in a statement to the press Meakin said, "The new machine will give us much greater flexibility. It will allow us to provide a much faster service, introduce a variable charging structure to meet the different needs of our users, and make possible the installation of many new and exciting features."

Without a doubt, the 512 block character transfer charge has put off a lot of potential and existing users of Telecom Gold. Existing users of the MicroLink service will be looking for even greater value for money, and I hope that MicroLink are now in a position to deliver the goods.

Kermit

No, not the little green frog as seen on the Muppets, but a *new* file transfer protocol instead.

Kermit has been around for a few years, but has always been dwarfed by the very popular XMODEM file transfer method. However it's now being used more and more here in the UK and public domain versions for all the popular micros are abundant.

Kermit is much more than a means of transferring files from A to B. It consists of a number of commands that allow you to configure your Kermit system in a variety of ways. This enables you to transfer any type of file you care to name.

There are two reasons for highlighting Kermit in this column. First, it's in the public domain which means that it's free of charge, and secondly, networks such as MicroLink are starting to use it.

Getting hold of a copy of Kermit for your Commodore machine, be it Amiga or C64, should present no problem. The Independent Commodore Products User Group (ICPUG) can supply members with a copy on disk, and I have found a version for the C64 on Compunet. The 'official' distribution centre for Kermit is at Lancaster University.

You can dial up their mainframe and download the HEX files and reconstruct the version on your micro, or send off for a version on disk (check online for details on how to do this).

If you intend to download a version from the University then call the Lancaster mainframe on 0524 67671. Once connected enter 'CALL KERMIT', the password is also KERMIT. At the system prompt '$' enter 'SELECT C64' or 'HELP' or '?' if you need assistance. Entering 'SELECT C64' will log you into the directory for the C64 implementation, you can then use commands like TYPE and DIR to list files and directories.

If all this is a bit daunting don't panic! First download the ".DOC" file, logoff, then list or print the file. This will not only give you information on Kermit and how to use it, but what files you should have for your particular implementation – good luck.

As mentioned, MicroLink is currently experimenting with Kermit on system 72. I have been trying it out for a few months with varying degrees of success. Basically the implementation of MicroLink will enable you to upload/download files be they text or binary. You could send a program to a friend who lives across the country, or in another country by using email which is handy!

FT

Another file transfer system which is being used on Telecom Gold is FT. This is in fact none other than the popular XMODEM file transfer. At present FT is only available to those with corporate accounts although I believe if it proves to be a success then it will be made available to all Gold users – full details next month.

The Net Gets Musical

A new contributors area should be launched on Micronet by the time you read this. Called Music City, it will consist of news and features about computer music. One of the main attractions will be telesoftware download files for a variety of machines including the C64.

As we are all aware, there are

hundreds of music demos in the public domain. All the music demos of popular commercial music from records and films is breaking the copyright law, and Micronet has taken steps to ensure they don't do the same.

"Micronet has no desire to flout the copyright laws", said PR manager David Rosenbaum, "hence we have reached agreement with the Mechanical Copyright Protection Society over the matter of computer music files on Micronet."

What this means is that if a subscriber wishes to submit a music demo of a contemporary tune that is not of his or her own, then Micronet will pay a royalty to the MCPS; thus keeping everything above board.

Phil Godsell, Micronet's software manager is inviting submissions from all subscribers, and if the tune is good enough you'll get paid for it as well. Certainly the emphasis is on music produced on the BBC micro, because the Beeb is the largest group of users on the Net. However, as we are all aware the C64 is a far superior machine when it comes to producing dulcit tones, so why not submit your own composition?

Hayes Gets Cheaper...

Anglo computers who stock the Enterprise range of modems has submitted a new range of HAYES compatible modems for approval.

Called the Enterprise Turbo range, two models are due for approval real soon. Both models support V21 (300/300 baud), V23 (1200/75 and 75/1200 baud) and V23 half-duplex (1200/1200 baud). In the case of the Enterprise II Turbo V23 full-duplex (1200/1200 baud) is also supported.

The modems are full Hayes Smartcom compatible and have a number of extensions. These include a 60 entry user programmable telephone number store with auto ID and password facilities, auto-dial, full S-register display, and if you are connected to the Mercury network the automatic-dial to said network will be useful.

What's also interesting is the price. The Enterprise I Turbo will cost £149.95 (ex VAT) and the Enterprise II Turbo will cost £299.95 (ex VAT).

...And Smaller!

Digital Matrix, based in the West Midlands, is now importing a rather nifty device called the Discovery 1200P Hayes compatible modem. Features include pulse and tone dialing, CCITT and Bell frequency specifications, and 300/300 as well as 1200/1200 full duplex operation.

What's so special is the size and price! The modem is just a little larger than a packet of 20 cigarettes and costs only £99 (ex VAT)!! It should be noted that currently it's not BABT approved but *Your Commodore* understands that the modem will be submitted for approval.

A full review of the Discovery 1200P will appear in a future issue.

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Font Master 128

Could this be the ultimate C128 wordprocessor?

By Stuart Cooke

It is often forgotten that the C128 is an excellent 'work-horse', with a wide range of accompanying business/small business software available. In this article we look at the Font Master 128 which takes wordprocessing on this superb computer a step further.

Font Master 128 not only offers all of the normal facilities that you would expect in a good wordprocessor, such as headers, footers, changing layout etc, but also over 45 new character fonts. These allow the user to print text in styles ranging from Greek to Arabic.

Program Requirements

You can only use Font Master 128 on an 80 column display. C128 users who only have 40 columns will not be able to use the program. The wordprocessor is supplied on two disks, one of which contains the wordprocessor, other utility programs and a few fonts, and the other contains extra fonts. If you are lucky enough to have a 1571 disk drive, both single-sided disks can be copied onto one double-sided disk. It is worth pointing out that the Font Master disks are not protected which allows you to copy the program and place the original disks somewhere safe. However, a dongle (small circuit board) must be placed in the cassette port in order for the program to work.

A setup program is provided so that you can tell the program exactly what type of printer and interface you wish to use with the program. Over 100 different printers are supported together with all of the popular interfaces. One good feature of this setup program is that it will tell you what switches need to be set on any interfaces in order for it to work with the program. The setup file also tells you what sort of performance you can expect from your printer when used with the package. Obviously a printer such as the Commodore MPS801 will not give as high a standard as something like the Star NL-10.

Entering Text

Font Master 128 is used like any other wordprocessor; text is typed in together with certain codes to specify print styles, layout etc. Most commands are entered through a combination of the CONTROL, SHIFT and Commodore keys. A help facility will show you what keys to press to achieve a certain function.

Combinations of the above keys are used to select commands which include:
A new font
A new print style (bold, compressed etc)
Underlining on and off
Tall character height
plus many more.

One extremely useful function for foreign users is the ability to overlay one character with another, i.e. allowing characters with accents to be created. Your printer must support backspacing to make use of this facility.

Formatting

As well as the range of single letter commands mentioned above, over 50 two letter formatter commands also exist. These commands allow you to select such things as:
the length of the paper you are using;
the size of the margins;
turning on justified print;
turning on centering;
defining the contents of headers and footers;
printing in columns;
inserting graphics in text;
plus many more.

The option of turning on proportional spacing exists together with a special set of tabulation commands that make sure the altered spacing when proportional is on, does not affect the layout of tables, etc. This is great when you want to produce high quality tables.

Pretty Pictures

You may have noticed that the above list of features mentioned graphics. Font Master 128 has the ability to include a picture created from another program within your text. More of this later. The picture can either be placed in your document with the text running over it or around it. The facility to reverse the picture (i.e. make a negative) also exists. You don't have to use a computer graphic in your text – you can tell the program to leave a blank square of a size that you specify, so that you can stick a picture in from another source.

Newspaper Style

Font Master 128 has the ability to

print in columns, just like a newspaper. The setting up of the column size is left to the user, the program handles everything else. If your printer reverse feeds the printer will automatically move the paper back to the start of a new column. If your printer doesn't reverse feed then it is up to the user to move the paper to the top of each column.

Input/Output

As you would expect from such a sophisticated package, Font Master 128 offers many input/output facilities. The user can load and save fonts to disk, up to nine fonts can be resident in memory, bring up a disk directory, send disk commands, and manipulate text.

Text manipulation commands include the ability to load and save files in both program format and sequential format. The ability to save and load in sequential format allows you to use text that has been produced by other wordprocessors or database programs. Text files can also be merged into existing text files and areas of text, rather than the whole document, can be saved out.

Mail Lists

The ability to use form files also exists within Font Master 128. As an example of a form file let's say that you had the same letter to send to 50 people – the only changes that you require on each letter will be the name and address. With form files you can set up a letter with special codes, indicating where you want information to go. When you print the letter the special codes are replaced by information from a form file, in our case the form file would contain the names and addresses of the 50 people that we were sending our letters to.

Seeing is believing

Once your document is finished it is nice to see exactly what you have done before you commit your prose to paper. A video preview option allows you to see the document on the screen just as it would appear on paper, including the changes in character size, font, etc.

Foreign Language

Font Master 128 comes complete with a variety of foreign languages so that your printout can be in Greek, Russian or even Arabic. One problem with this is the characters for foreign languages do not always correspond to English letters, and the screen display will therefore look rather silly.

Font Master 128 overcomes this problem by allowing you to load a new character set into memory. This means the characters that you see on screen will be the same a those on the printer. Font Master 128 is the only wordprocessor I know that has this facility.

Some foreign languages present even greater problems because they are entered from right to left. Fear no more, Font Master 128 allows you to type in and edit text 'backwards'.

Other languages are even more complicated in that text is written from right to left and numbers are written from left to right. Font Master 128 also makes provision for this.

Going Further

A variety of programs that are supplementary to the wordprocessor are supplied on the Font Master disk. All of these are accessed from a menu which appears when you boot the disk. I have already mentioned the setup file earlier in this article, a graphics convertor, font editor and text convertor are also provided.

The Graphics Convertor allows you to convert a high-res picture or a printshop picture into such a format that they can be used with the wordprocessor. Facilities also exist to make pictures up from a number of images taken from printshop.

Should Font Master 128 not have a font to suit your requirements, then the Font Creator will solve your problems. This program allows you to design your own fonts for use on the printer and character sets for use on the video screen. The program has a variety of commands for editing fonts including loading, saving and dumping the fonts to the printer.

Because many people have access to other wordprocessors, a program exists called the translator. This program allows you to take text from a variety of popular wordprocessors and convert it into such a format that it can be loaded by Font Master 128. If your wordprocessor saves out sequential files then you will not require this option as the wordprocessor will load sequential files without any problem.

Verdict

Font Master 128 is the most powerful wordprocessing package that I have used. It has all of the facilities that you would require from any wordprocessor plus many more that you would never have thought to be possible. An important point worth noting is that you don't have to use the fonts, you can produce printouts in your printer's normal face.

A spelling checker should be available in the near future which will add that finishing touch to the package.

Font Master 128 is the most comprehensive wordprocessor that I have used on the C128, it's also one of the cheapest.

This package is an essential piece of software for C128 users.

Printouts from Fontmaster 128

Numerous text sizes are available with Fontmaster 128

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CELTIC is very pretty

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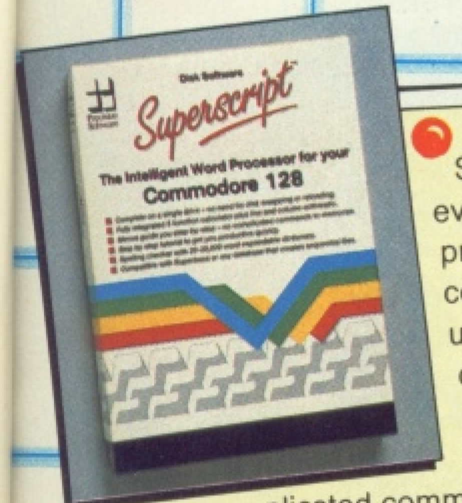
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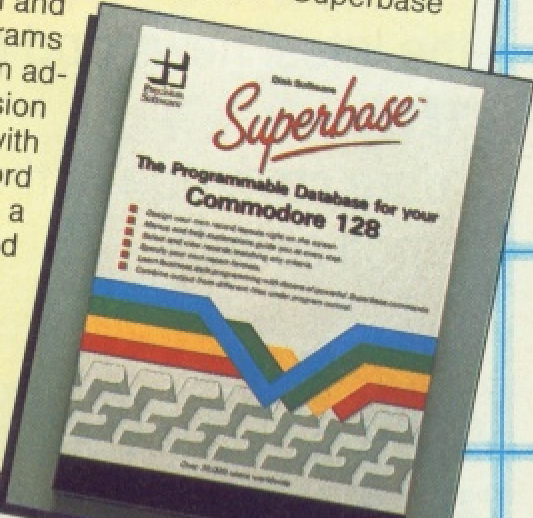
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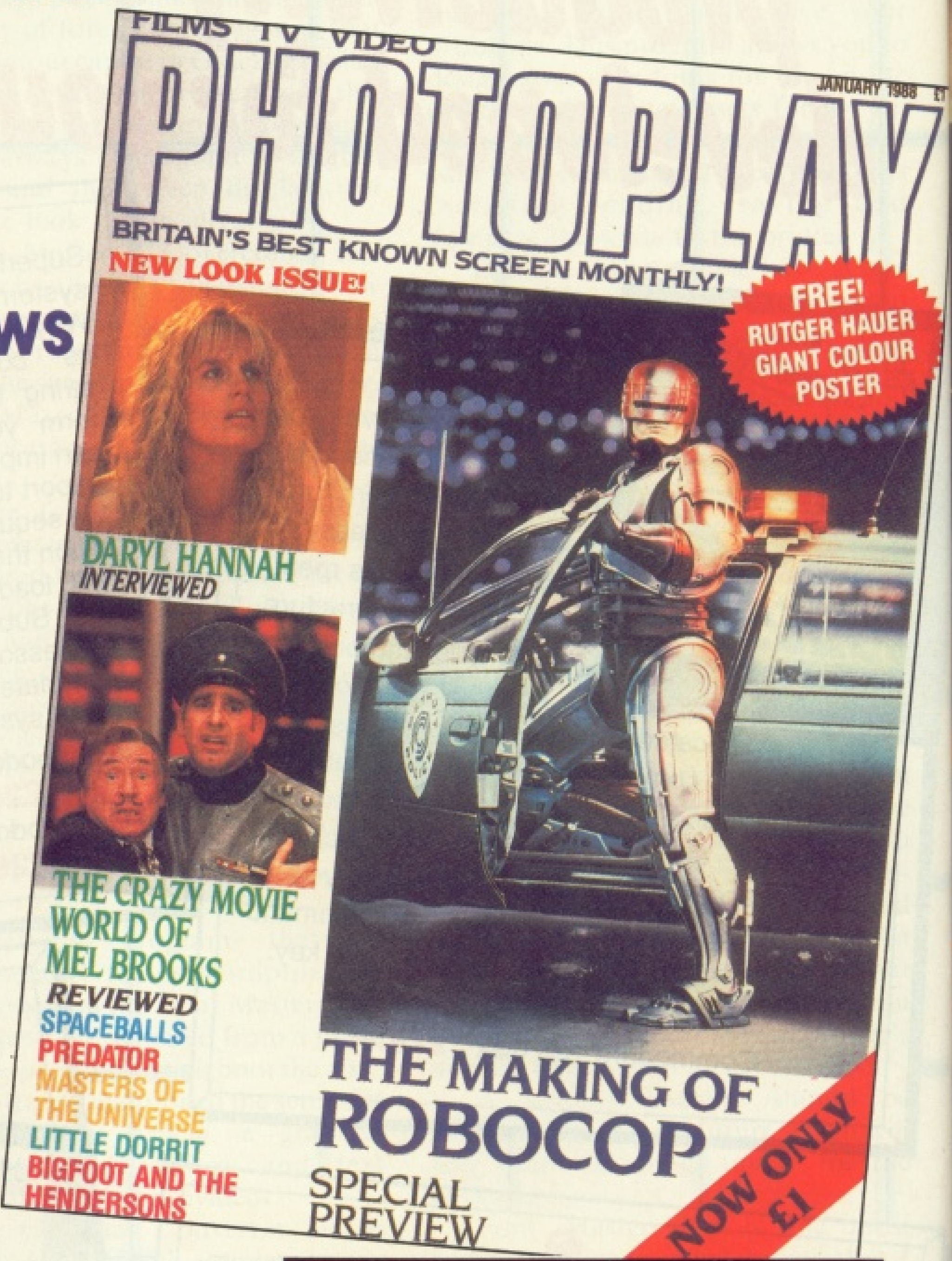
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Amending Commodore 64 Basic

Various avenues can be opened to the Commodore user when commands are added to 64 Basic. Peter Gerrard starts us off with simple background and border colour changes.

By Pete Gerrard

Ever since the Commodore 64 first appeared (and my, what a long time ago that seems to be) people have moaned and groaned about the version of Basic that it was equipped with. They complained of no procedures, which has always struck me as a rather pernickety argument when it takes five hours to search through a twelve page listing in order to find a four line procedure called Fred.

At least with a GOSUB 9000 you know where line 9000 is going to be! No structure to the language at all, they would whinge, ignoring the all-important fact that if a program runs and works, then it works, whether the code is a thing of beauty or something that exhibits the structural qualities of an origami butterfly in a thunderstorm. No commands for using graphics and sound, they whine, and there they have, a very valid point, at last.

There are two commands in the Commodore 64's repertoire for manipulating sound and graphics, and these are PEEK and POKE. Even PEEK isn't a great deal of help most of the time, since a lot of the registers used to handle these two admittedly important features of the 64 are write-only. That is, you can POKE things in there but you can't PEEK to see what you've already got. Write-only memory, or WOM I suppose, can be a bit of a nuisance at times.

Now I'm not proposing surgery to your computer, since the write-only aspect of things can be overcome by judiciuous use of variables and a little something called logic when you sit down and write your programs.

What we can do, however, is improve the Basic language that Commodore have seen fit to equip us with.

There are many ways of going about this, but in this first article we'll start by taking a look at something that is fairly simple to follow (and implement!). It will give you the opportunity to muck about and alter in whatever way you please, and that leads the way for the greater things that are to come.

Just as you might expect Ed Moses learnt to walk before he began to run, then to master running before he started leaping about over hurdles (and yes I know he's been beaten at long last) so you too will have to jump in at the shallow end at first. To begin with, what are we looking for from our initial program?

Program Creation

We want to be able to do three things with a new command, and these are:

1) Allow Basic to accept a new keyword.
2) Allow that keyword to have parameters associated with it.
3) Act on the new keyword.

If one or all of these fail us then we will get nowhere, so the first step must be to see how Basic accepts the keywords that it already has, and how we might go about altering things so that it will learn to accept one of our new words as well.

Step One — Character Get Routine

Whenever you type something into your 64, everything is stored in memory as you type. It does not, as you might think at first, go into the keyboard buffer. Rather, it is stored somewhere else and (very cleverly) if a Basic keyword is encountered, it is tokenised as well.

In other words, one character replaces the five letters PRINT in that command, or another character might replace the four letters of POKE, and so on. A little memory saver, there. All this continues until you hit the RETURN key, at which point the Commodore 64 has to try and make some sense out of what you've just typed in. To do this it makes use of a routine know as CHARGET, short for CHARacter GET, and this lives in memory from $0073 to $008A, and looks like this:

```
$0073 INC $7A
$0075 BNE $0079
$0077 INC $7B
$0079 LDA $021E
$007C CMP #$3A
$007E BCS $008A
$0080 CMP #$20
$0082BEQ $0073
$0084 SEC
$0085 SBC #$30
$0087 SEC
$0088 SBC #$DO
$008A RTS
```

The part that concerns us here is the region from $0084 to $0088, combined with the fact that this is stored in RAM, not ROM (or WOM!), which means that we can alter it. So, with the aid of an assembler you might care to type in the following:

```
$C100 SEC
$C101 SBC #$30
$C103 SEC
$C104 SBC #$DO
$C106 RTS
```

Or, if you prefer a Basic loader:

```
10 FOR I=49408 TO 49413:READ
A:POKE I,A:NEXT
20 DATA 56,233,48,56,233,208,96
```

which would do the job equally well. Now, we can alter CHARGET so that the latter part of it reads like this:

```
$0084 NOP
$0085 NOP
$0086 NOP
$0087 JSR $C100
$008A RTS
```

or again, if you like a little spot of Basic:

```
10 FOR I=132 TO 137:READ
A:POKE I,A:NEXT
20 DATA 234,234,234,32,00,193
```

Now the routine will do nothing for a while before leaping off to our new machine code subroutine at location $C100, which as you've seen, simply emulates the orignal code that was already in the CHARGET routine. So what's the point of altering it then? So that we can replace the three NOPs with a call to another subroutine. Before we do that we must learn one or two other things, and CHARGET routine when altered is not a happy thing unless the code you put in yourself works perfectly, and works perfectly first time.

Commands and Parameters

You're probably all familiar with various concepts connected with altering Commodore 64 Basic. Use of interrupts (POKEing 788 and 789 with our new interrupt location), or the use of internal subroutines to accept parameters and acting upon them (JSR $B7EE, STX $D020 or wherever is one easy way of doing it). You'll be relieved to know that we're going to use none of this.

When you type something in, and CHARGET either accepts it as a valid expression within the frameworks of Basic, or chucks it out as something it's never heard of and probably never wants to hear of, what you have just typed in, is stored in memory. (In location $0200 onwards, in fact, or decimal 512 if you prefer.) Now you can't check this just using Basic, since the contents of those locations obviously alter every time you enter a command to see what's in there, but that is where the information goes, believe me. Check it using interrupts if you want.

Say we want to have something known modestly as PETER for our new Basic keyword. To keep things simple, we'll just change the background and border colours for now, before we get onto more exotic commands later on in this little series. Obviously, then, we'll need to have the command use two parameters for the two colours, in the form PETER A,B. To give a concrete example, how about PETER 1,2? The content of location $0200 onwards, if POKEd onto the screen, would reveal PETER 1,2 followed by whatever else happened to be in there from any earlier typing efforts.

You begin to see my point. The information is stored somewhere in memory, and it's up to us to dig it out and act on it. Let us, first of all, make sure that Basic will recognise our new keyword PETER. When we are convinced of that we have almost won this first, easy, battle in getting the 64 to accept new Basic keywords. We know where the parameters are stored, it then just becomes a question of getting them.

New Keywords

You'll have noted that CHARGET is already diverted to $C100, and that the little diversion there finishes at location $C106. Well we'll make use of the space after that to get our new keyword accepted.

To begin with, we'll need to store the values currently held in the three machine code 'variables', otherwise known as the X register, the Y register, and the accumulator. Then, we'll need to look at what is stored at location $0200 onwards and see if the first five characters correspond to PETER.

Then, we can check for the parameters and cause something to happen. This means that we'll have to have a little table stored in memory with our new keyword in it (and when you've added more than one command you'll need to store the length of the new words as well, at least you will if you're going to be using this method). Finally, if the word found from $0200 onwards is not a new word then we'll have to retreat to CHARGET to let it get on with its job of sorting out the existing Basic, without worrying itself over anything that we might get up to. The machine code instructions to perform these tasks look something like this:

```
$C107 STX $COFF
$C10A STY $COFE
$C10D STA $COFD
$C110 LDX #$00
$C112 LDA $0200,X
$C115 CMP $C130,X
$C118 BNE $C122
$C11A INX
$C11B CPX #$05
$C11D BNE $C122
$C11F JMP $C140
$C122 LDX $COFF
$C125 LDY $COFE
$C128 LDA $COFD
$C12B RTS
```

In order for this sequence of commands to operate properly we need to have the relevant information stored at location $C130 onwards, so that the instructions at locations $C112 and $C115 can compare what has been typed in and stored at $0200 onwards, with the sequence of values for our new keyword. So, at locations $C130 to $C134 we need the (hexadecimal) values 50, 45, 54, 45, 52,

which together make the letters P-E-T-E-R, as it is in this form that they will be stored at $0200.

Then, we need some code at location $C140 onwards, so that the program, having checked for the word PETER and found it present, has something to do to prove to us that this new word has been entered. To keep things simple for now, we might have something like:

```
$C140 LDA #$65
$C142 STA $0400
$C145 JSR $A474
```

In Basic loader form, these two sequences of instructions look like this:

```
10 FOR I=49415 TO 49451:READ
A:POKE I,A:NEXT
20 FOR I=49472 TO 49479:READ
A:POKE I,A:NEXT:END
100 DATA
142,255,192,140,254,192,141,253,192,
162,0,189,0
110 DATA
2,221,48,193,208,8,232,224,5,208
120 DATA
243,76,64,193,174,255,192,172,254,
192,173,253,192,96
200 DATA
169,101,141,00,04,32,116,164
```

The program works as follows: After storing the values for the X and Y registers and the accumulator, it looks at the value currently held at location $0200 and compares it with that stored in our table at $C130. If the two are not equal, it branches out of this check immediately and races back to CHARGET to get on with the job in hand. If they are equal, then we loop around to check the value currently held at $0201 against that at $C131. Again, if they aren't equal then CHARGET is allowed to get a look in, but if they are we continue around the loop until we're comparing $0204 with $C134.

If those two are equal then the word that has been typed in matches that stored in memory as our new keyword and program control can branch off to the code starting at location $C140. This just puts a heart in the top left hand corner of the screen, but at least it proves that the command has been recognised. All that remains now is to put some additional code at $C140 to allow for parameters, and then to act on those parameters. This is the easiest part of all, since we're only altering the background and border colours.

But first, we must inform CHARGET of what's going on, so we'll have to replace those NOPs that we put in earlier with something a little more sensible. Like this:

```
$0084 JSR $C107
```

or

```
10 FOR I=132 TO 134:READ
A:POKE I,A:NEXT:END
20 DATA 32,07,193
```

Now CHARGET is diverted first of all to $C107 to check for the new keyword, and if it is found then a program operation is carried out and control returned to the normal Basic 'ready' mode by use of the internal ROM routine starting at location $A474. Otherwise, back to CHARGET and the routine that has now been copied into locations $C100 to $C100 to $C106, and the 64 can carry on as normal.

The code at $C140, allowing for parameter passing and acting on those parameters, looks something like this:

```
5 B=0
10 FOR I=49408 TO 49561
15 READ A:POKE I,A:B=B+A
20 NEXT
25 IF B<>21046 THEN PRINT
"data entered incorrectly — please
check,":END
30 PRINT "all present and correct -
well done,":END
100 DATA
56,233,48,56,233,208,96,142,255,192
105 DATA
140,254,192,141,253,192,162,0,189,0
110 DATA
2,221,48,193,208,8,232,224,5,208
115 DATA
243,76,64,193,174,255,192,172,254,
192
120 DATA
173,253,192,96,255,255,255,255,80,69
125 DATA
84,69,82,255,255,255,255,255,255,255
130 DATA 255,255,255,255,173,5,2
201,32,208
135 DATA 80,173,6,2,141,128,192,
173,7,2
140 DATA 201,44,240,34,105,9,141,
32,208,173
145 DATA 8,2,201,44,208,32,173,9,2,
141
150 DATA 129,192,173,10,2,201,0,
208,37,173
155 DATA 129,192,141,33,208,32,
116,164,13,128
160 DATA 192,141,32,208,173,8,2,
141,130,192
165 DATA 173,9,2,201,0,208,9,173,
130,192
170 DATA 141,33,208,32,116,164,
105,9,32,140
175 DATA 193,32,250,173
```

You'll notice that we've included the whole code here, rather than just bits and pieces. This explains the presence of some bits that you've already seen. However, it is a lot easier (and a lot less confusing) to say 'type this in' rather than 'type in the bit from that memory location to that one, altering this bit, and changing that to ...'. It might mean a shade more typing, but at least you're more certain of getting it working first time!

The command will now accept things like PETER 0,1 for a black border and a white background, or PETER 10,10 for a pink border and a pink background (very nice). I freely admit that the checking for the various parameters is not as roobust as it might be, and you might care to take a look at that when you're examining the workings of the whole thing. You might also care to add one or two new commands of your own, but remember that a) commands cannot incorporate existing keywords, so that BORDER for example is not allowed, since it includes the word OR, and b) commands added in this fashion cannot be tokenised, or abbreviated.

In conclusion, this is just one way of adding new commands to the C64's repertoire. Next time we'll look at another way of doing things which makes it alot easier to add more than just the command, and which doesn't rely on tedious error checking to get the parameters sorted out.

So, until then, your homework (let's look through the round window children) is to tidy up that error checking, and perhaps add some commands of your own so that you can gain some familiarity with the workings of CHARGET and indeed the Commodore 64. Me? I'm off to watch some of the Test Match. Bye for now!

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Ackroyd's Saga

Continuing our learning tables routine we take a look at changing the positions of the nasties and key portions

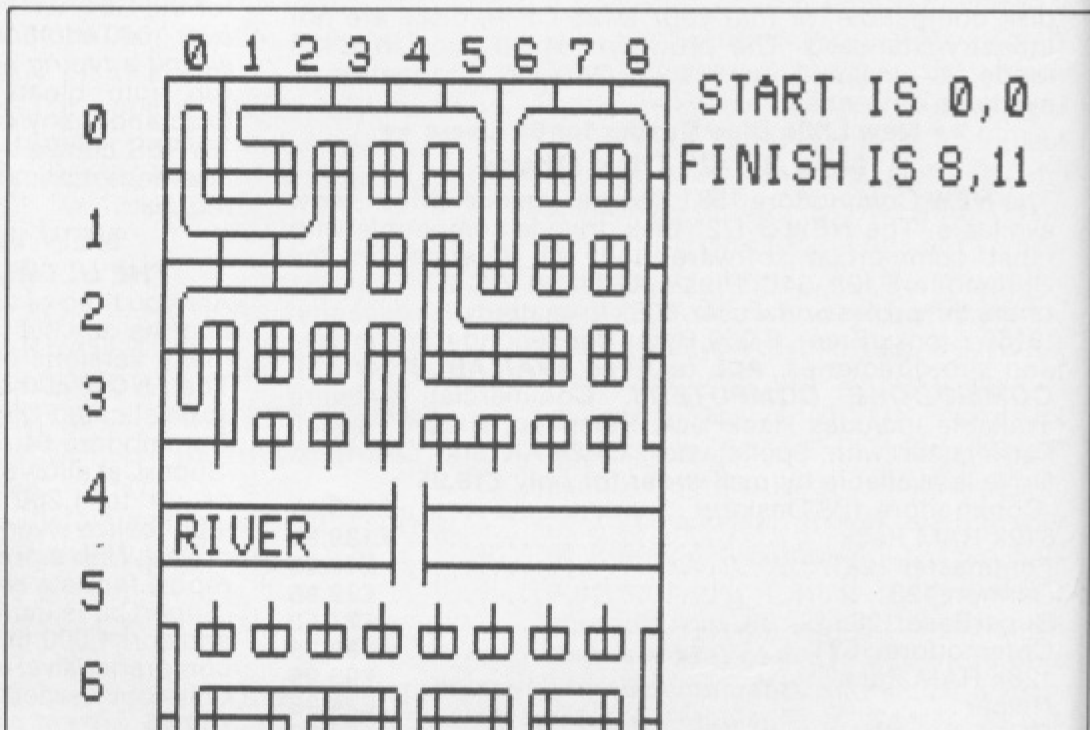
By Allen and Margaret Webb

In the BASIC loader, we provided the options to alter the response time and the number of questions you needed to answer. In the final part, we will teach you how to change the positions of the nasties and key portions and thereby change the game.

As you can see from the map, the play area occupies 108 squares on a 8 by 12 matrix. Each square can have any of four exists open. The play starts on square 0,0 and the end point is on 8,11. We are using normal co-ordinates where the first number is the X co-ordinate or the horizontal position. The second number is the Y or vertical position. The 0,0 position is therefore the top left hand corner. Try playing the game with the map in front of you and you'll soon get the idea.

The position of any nasties is held in two tables in the code. Positions by altering these values, you move nasty. The BASIC program does all this for you. The editor allows you to load up the relevant block of code (we called it OBJECT 2). You can then rearrange the game to your satisfaction. When you choose the exit option, it allows you to save the modified code.

Although it forms part of a two part game, Ackroyd's Saga can also be played independently. If any of you have any comments on the game, please let us know via the magazine.



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Through the Round Window

Do you C64 and 128 owners dream of having access to windows, icons, mice and windows? Now the answer is here in the form of a Window Environment Operating System.

By Rony van Hove and Bant Duchesne

*N*owadays, when you hear about WIMPS (windows, icons, mice and pull-down menus or windows) the machines which spring to mind are the Atari ST, Amiga, Apple IIGS, Apple MAC and IBM/PC. But what about the 8-bit world?

A few packages for the Apple IIC have been seen but never for our Commodores 64s or 128s. That was until the magic name of Berkeley Softworks appeared with their introduction of GEOS. It lived up to its claims, but alas for cassette users it was still a dream.

Well folks – the answer is now within reach. I proudly present the WEOS (Window Environment Operation System) with WEOBASIC. It's a form of a Basic extension which will enable you to access the magnificent world of WIMPS. And now for the bad news – you'll have to drop the *icons* because at the moment it's impossible to incorporate them (hardware reasons).

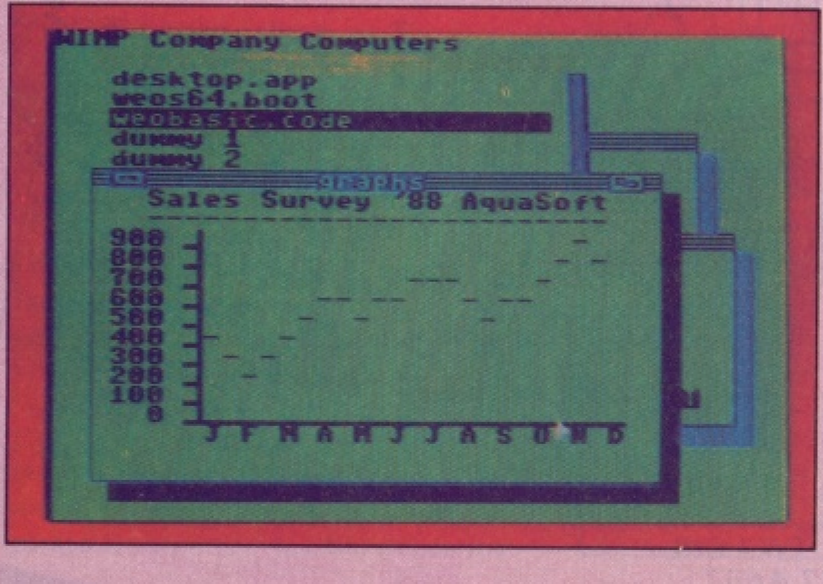
However, I'm working on an icon extension (with raster interrupts). If you do want icons, check some back issues of *Your Commodore* for Allen Webb's article on WIMPS.

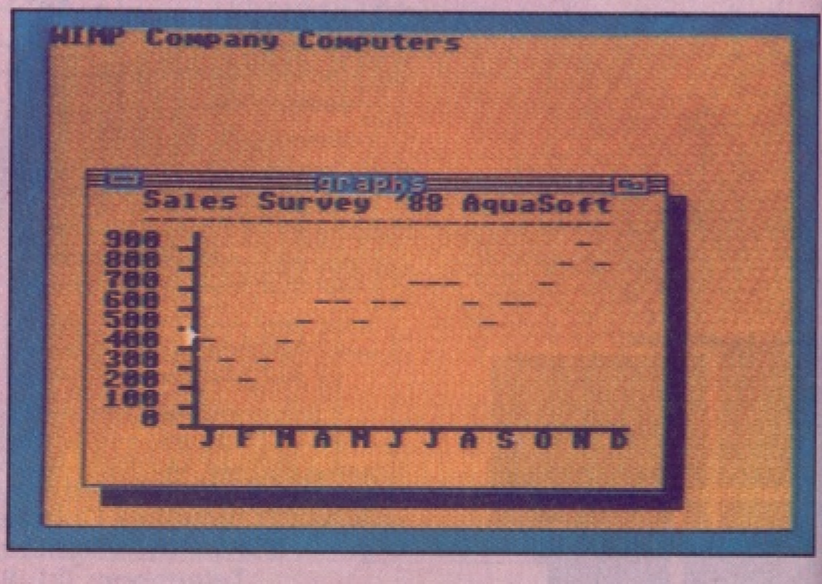
So now all you need to do is type in almost 8K (!) of machine code – read on!

All commands and functions are listed as below:
Syntax: well, everyone knows what I mean.
Mode: this can either program or direct or both (all).
Output: this is screen or windows.
Description and examples.

The windows fall into three categories:

- All purpose window (APW). Four of these can be opened up.
- Static window (SW). Only one window is allowed.
- Pull down menu (PDM). You can only open one of these at the same









time but you can define up to eight PDMs.

You can open up to five windows (four APWs plus one SW or PDM). You can use any nine DIN mouse (e.g. Reishware mouse, Amiga mouse and ST Mouse) or use an ordinary joystick. Just stick in port two and WEOS will do the rest.

Starting up WEOS

Use SYS 64738 or reset your computer. If you own a Commodore 128 you must go to 64 mode. The following message is printed in green letters on a black screen:

WEOBASIC 1.0
WINDOW ENVIRONMENT OPERATING SYSTEM 4.0
(C) 1987 RONY VAN HOVE
(C) 1987 ASP LTD.
31743 BYTES FREE

Before I continue you should understand the following:

- We are working in BANK 3 instead of BANK 0.
- BASIC starts at 32768.
- BASIC TEXT STARTS AT 1024.
- Screen starts at 52224-53223 (CC00-CFE7).
- Character set resides in 57344-61439 (E000-EFFF).
- PDM/SW buffers are in 61440-65535 (F000-FFFF).
- PAW buffers are in 40960-49151 (A000-BFFF).
- Free use in 49152-52223 (C000-CBFF).

Never use address FB-FE, 2A7-2FF (parameter block one) and 33C-3FA (parameter block two, however this is a temporary block because most data is, after manipulations, flushed to parameter block one).

- Character codes 91-124 are redefined (also the inverse codes), so don't worry if you see some strange codes on your screen.
- If your basic program has crashed and you press reset or SYS 64738 for strange on your screen, but don't worry.
- If you're basic program has crashed and you press reset or SYS 64783 for the second time, your screen will contain strange things, but don't worry! However your program cannot be recalled with OLD, because after a reset the system is set first to BANK 0, and since the screen resides in 0400-07E7, your basic program is damaged, so when you come back in BANK 3, you can't OLD it again. (So save your magic masterpieces before you try.)

The WEOBASIC commands and functions:-

CPOS
Syntax: CPOS (fl).
Mode: all.
Output: window.
CPOS-reads the cursor position in a window.
When fl=0 it reads the current x-position.
When fl=1 it reads the current y-position.
When there are no windows on the screen CPOS will return wrong values.

COLOUR
Syntax: COLOUR re,co (where re=0-2 and co=0-15)
Mode: all.
Output: all.
Selects the colours where re can be:
0 for the border colour
1 for the background colour
2 for the foreground colour

CLS
Syntax: CLS
Mode: all.
Output: all.
Performs a clear screen (= PRINT CHR$(147);).

CURSOR
Syntax: CURSOR x,y (x=0-39 and y=0-24)
Mode: all.
Output: all.
Places the cursor at the specified screen/window co-ordinate.

INVERSE
Syntax: INVERSE x,y (x=0-39 and y=0-24
INVERSE, x,y,xl (x and y as above and xl=1-40).
Mode: all.
Output: all.
This instruction inverts a specified length (xl) at a specified position (x,y). If no length is given the default of 1 is taken.

IF
Syntax: IF condition THEN . . .
IF condition . . .
Mode: all.
Output; all.
This is an enchanged version of our C64s IF instruction. In the normal case the condition can be followed by a GOTO or a THEN. But I decided to change it, the result being that you can put any instruction after the condition. e.g.: IF X=2 A=2 is the same as IF X=2 then A=2
IF Z=0 or SGN(y) PRINT" fun,fun"
Note: never put a line number after the condition (GOTO).

SCRN
Syntax:x=SCRN(x,y) (x=0-39,y=0-24)
Mode: all.
Output: all.
Returns the screen POKE code of the specified location on screen/window.
e.g.: 10 CURSOR 1,1:PRINT"A"
20 IF SCRN(1,1)=1 PRINT "IT WAS 'A' "

PAUSE
Syntax: PAUSE x (x=0-255)
Mode: all.
Output: all.
Output: all.
Pauses the program x times (1 unit pauses 5/14 secs)
If x =0 it waits for a keypress.
e.g.: 10 PRINT"Hit a key": PAUSE 1
20 PRINT"QUICK HEY!!?": PAUSE 1
30 PRINT "STRANGERS IN THE PRINT "STRANGERS IN THE NIGHT":PAUSE 255

BUTTON
Syntax: x=BUTTON
Mode: all.
Output: all.
Scans the trigger of joystick or the left button of your mouse. When you don't press the button it will return a 0 otherwise it will return a 1.
e.g. 10 IF BUTTON=1 PRINT "FIRE. . FIRE":GOTO 10

DESK
Syntax: DESK i (i=0-225)
Mode: program only.
Output: screen only.
This is a rather unusual command. It performs a total initialisation of your computer for a desktop application, i.e. the screen will be filled up with the specified code (i) (mostly i=94, because this is the desk pattern) and the upper row of the screen will be cleared and filled up with the PDM-headers. All opened windows will be removed.

POINTER
Syntax: POINTER ON
POINTER OFF
POINTER po,co(,xs(,ys))
Mode: all.
Output: all.
Pointer initialises the pointer, po is the sprite pointer (more info about pointers in your C64 reference guide) and co is the colour. The next two paras are optional. The first specifies the x acceleration and the second (ys) the y-acceleration (only between 0-8).

The sprite for the pointer is predefined and is built in WEOS. WEOS has in fact three predefined sprites, more info by the MOVBLK command.
e.g. POINTER ON: POINTER 47,3,2,2:MOVBLK 0,47 And if you move your mouse/joystick you can move the pointer.

MOVBLK
Syntax: MOVBLK source, destination (both 0-255)
Mode: all.
Output: all.
As mentioned earlier, the system has three predefined sprites but you can add seven sprites of your own which will be always in WEOS if you save or load it again. The first para refers to the system sptite nr., the second refers to the destination pointer (you can only use 0-47, since 48.63 are in the screen area and 64-255 are behind KERNAL and the I/O chips). The following sprites are incorporated:
0 : pointer
1 : hook 1
2 : hook 2
3-9 : free use
To define system sprites 3-9 POKE in your data from 39969. Each sprite must contain 64 bytes as usual Now save your new version of WEOS on a separate disk or cassette.
e.g. .... look at pointer.

DIR
Syntax: DIR
Mode: all.
Output: screen.
Displays the directory of device 8 drive 0 on the screen

MOUSE
Syntax: x=MOUSE
y=MOUSE(p)
z=MOUSE(p)
Mode: all.
Output: all.
MOUSE returns the direction of the current movement of the joystick/mouse (x=PEEK(56320)AND15)
MOUSE(p) where p=0 or 1. Returns the position of the pointer in a WINDOW (x=0-39 y=0-24).
MOUSE(p) p=0-1 : same as above but now position on the screen.
p=2-3: returns x and y acceleration.
p=4 : return pointer colour.
Try this:

```
10 POINTER ON:POINTER 47,2,3,3:MOVBLK 0,47
20 SOPEN 25,10
30 CLS:WPRINT"SX="MOUSE(0);"SY="MOUSE(1)
40 WPRINT"MX="MOUSE( 0);" MOUSE ( 1)
50 PAUSE 1:GOTO 30
```

After you typed it all in, you will see a static window with flashing information. The first two gives you the screen co-ordinates and the other two the window co-ordinates. As you will see every out of range gives you a negative answer. (-1).

This is quite a handy instruction for multiple choice menus. Use this together with INVERSE and you'll get a very professional look. Study our DeskTop program for a very good result. (Selection of a file.)

OLD
Syntax: OLD
Mode: direct.
Output: all.
Everyone knows this command.

WEOS
Syntax: WEOS x (x=1 or x=2)
Mode: program.
Output: all.
Because the complex structure of this statement I could not find a logical name. It simply does so much. WEOS works in conjunction with the pointer.

When x =1: Each time WEOBASIC performs this instruction it scans the whole screen for special symbols if any, inverts them and a whole series of information in the system is then updated (which you can read later by the necessary function provided by the system).

When x=2: It does exactly the same as above but now it also scans for menu handlings at the upper row (DESK must be executed first, otherwise it has no affection). If the pointer points to a menu header and you press the button, the header will be inverted and the menu is pulled down. The system will now wait until you have selected an option and then return to BASIC. However if you go to another heading the current menu will pop up and the system will return to BASIC, e.g.

```
10 DESK 94
20 POINTER 47,3,2,3,:POINTER ON:MOVBLK 0,47
30 WOPEN 1,2,30,10,"WEOS DEMO",3
40 WEOS 1:GOTO 40
```

Run it! An APW will appear on your desk and a pointer; when you move the pointer to one of the special symbols (the two symbols at both edges of the window), press the button and you will see it will be inverted! Try to point for the second time to the same special symbol again – you will notice that it won't be inverted back. The reason being that the system assumes that after you have pointed to a symbol it has to execute a user-defined piece of program. But how to invert it again so that it is back to normal? Well, that's not so difficult; you simply replace them with the normal codes (full list of symbols is listed in table 1).

Syntax: RUN
Mode: all.

Output: all.
This RUN does exactly the same as the normal RUN command, but it changes some registers. The result is that the normal RUN-token is not the same as the minor changed RUN, the new token is 238 directly followed by 1. (The first code is necessary the WEOBASIC as this is the sign for an extended instruction.) This also means that if your old programs contain any old Run statements you have to retype those statements after you loaded your program in WEOBASIC.

WINDOW
Syntax: x=WINDOW(wd)
Mode: all.
Output: all.
This function only works in conjunction with WOPEN; WCLOSE; WSWAP; WMOVE and with any other window command. wd can be:
0 – WINDOW will return the current window no – o=no window on screen
1-4 APW window no.
5 SW
6PDM
1 – current window's x-position
2 – current window's y-position
3 – x-length of window
4 – y-length of window
5 – shadow flag
N.B. when there is no window in action the function will return a negative answer (-1) except for WINDOW(0) which will return a null (0). We use this command in our desktop program for moving and copying windows.
windows.

DISK
Syntax: DISK
DISK a
Mode: all.
Output: screen only.
DISK displays the disk status (if you don't know again why the red led is flickering).
DISK a sends a disk command to device 8 drive 0 or 1. When no disk drive is connected to your C64 the system will ignore the command and continue with the rest of the program
N.B. when you want to read the disk status and you have no disk drive the system will hang up (RUN/STOP+ RESTORE). This instruction will not work correctly with all disk drives.

WCLOSE
Syntax: WCLOSE
Mode: all.
Output: all.
This statement will close the current APW; when no window appears on screen, nothing will happen. If there are more windows on your screen, the last opened will be closed. The two special symbols on both edges of the window will be placed on the previous window, and the next screen command will work on that window (e.g. WPRINT or CLS). When there is another type of window on the screen (e.g. a static window) it will cause an

error, e.g.

```
10 WOPEN 1,1,20,16,"WEOS":
WOPEN 6,7,9,3,HEY",7
20 PAUSE 0:WCLOSE:PAUSE
0:WCLOSE
```

SCLOSE
Syntax: SCLOSE
Mode: all.
Output: all.
Closes a SW, when SW is present on the screen no error will be printed. If there is still an APW window on your screen it will be activated after closing the SW (you can see this by the two symbols appearing on the window), e.g.

```
10 SOPEN 12;6:PAUSE 0:SCLOSE
```

WPRINT
Syntax: see PRINT)WPRINT does the same)
Mode: all.
Output: windows (APW & SW)
Almost the same as BASIC v2 print instruction. You can use both SPC and TAB functions as well as other characters such as ';' or ',' or BASIC variables, e.g.:

```
WOPEN 1,1,30,10,"DEMO FOLKS"
followed by :WPRINT "YC,THE
BEST";:WPRINT"WHO else?",
"NO...":WPRINTTAB(7)"MIX it
"SPC(5) A"=?"
```

When the window is full, it scrolls everything up. Of course, a window must be opened first.

MENU
Syntax: MENU mn ON
MENU OFF

MENU mn,xl,op,sp,menu (,mc(,wc(,sh(,sc))))
x=MENU (y)
Mode: program.
Output: all.
Probably one of the most powerful commands of WEOBASIC. – MENU mn ON (mn=1-8) opens a menu with the options. When the specified menu is not yet defined an error message will be printed. When you try to open a menu and the DESK command is not yet performed every menu will be opened at position 0, e.g.

```
10 MENU 1,10,2,1"DEMO   OPT1
OPT2  "
20 MENU 2,10,2,1"DEMO2   OPTA
  OPTB  "
30 CLS: MENU 1 ON: PAUSE
0:MENU 2 ON
```

When you run it, a menu will appear on the screen however without the 'header' DEMO and when you press a key, the menu will disappear and another menu will appear, again without a 'header'. Also the second menu is pulled down where the first one was pulled down. You can understand that this is certainly not a professional way to use pull downs menus. Delete line 30 and add this one:

```
30 DESK 94: MENU 1 ON: PAUSE
0:MENU OFF:MENU 2 ON
```

Run it! You will notice that everything is alright now the headings will appear, also inverted.

MENU OFF: operates just like WCLOSE or SCLOSE, the menu will be popped up and if there is an APW on the screen it will be activated (the two symbols you know!). If a static

window is opened and you try to pull a menu down an error message will be printed.

MENU: the third variation of MENU gives you the possibility to define a menu. The definition is always in program mode:

mm... menu no. (1-8)
xl.... length of menu window (3-40)
op... number of options (1-20)
sp... spacing flag (0 for no, 1 for yes)
menu. contents the menu options data
mc... colour of menu text (0-15)
wc... window colour
sh... shadow flag (0=no,1=yes)
sc... shadow colour

Well, well this is alot of information! The first para is the menu which must be defined. If the mn is out of range a friendly MENU SYNTAX error is printed. When you define it, the new data will overwrite the old one. The next para defines the number of options. 'sp' is the space flag, when you say yes the maximum allowed options is divided by 2 (so this means not 20 but 10 options)

The difference between those variations is shown by the next demo.

The difference between those variations is shown by the next demo. Delete lines 20 and 30 of above and modify 10 by:

```
10 MENU 1,10,2,0,"DEMO   OPT1
   OPT2   "
20 DESK 94:MENU 1 ON:PAUSE 0
```

You will see that the options are directly printed under each other. When you change the 0 in line 10 to 1 and RUN it again you will see that there is a space between the options.

The following para is the most important; this contains all menu text data which must be printed in the menu. The very first name is the menu heading which is followed by a left arrow (this indicates the end of the first name) and is directly followed by the name of the first option and again followed by a left arrow. Use a left arrow after each name and if you have finished your string type an up arrow. The previous demo illustrates the use of the string. DO NOT USE CONTROL CODES IN THIS STRING!! Remember to add as much options in your string as there is specified by the 'op' para.

The next paras are optional; 'mc' indicates the colour of the menu text but not of the header! The next one is the colour of the window, then comes the shadow flag. When this is set to 1 a shadow will be added to the menu. You have a choice when it comes to specifying the shadow colour. It is interesting that when you type a comma directly after another the system will use default values, e.g.

MENU 1,20,2,0,a$,2 (text colour is red)
MENU 1,..........,1,3 (text colour is white, and window is cyan)
MENU 1,..........,2,3,1 (all as above but with a shadow)
MENU 1,..........,3,,1,2 (cyan for text, foreground colour for window and red for shadow)
MENU 1..........,6,,0 (uses blue for text, foreground colour for window and no shadow)
but... this is wrong: MENU 1,.....,4, 2,,1 the reason is simple – the default for the shadow flag is no shadow so you can't define a shadow colour.

To be continued

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The ICPUG Column

The latest views from the country's biggest Commodore user group.

By Tim Arnot

I don't know about you lot, but I quite enjoyed the PCW show. Not because there was a lot to see – there wasn't. But rather because it was an opportunity to meet people and talk to them.

The first impression everyone has of the PCW show is its size. It's BIG, spanning both Olympia 2 and the National Hall. It took me three days to see the whole show during my off-duty periods from the ICPUG stand, and I'm not convinced even now that I saw all there was to see.

Having looked around, there was nothing on display that was new or really exciting. I shall now qualify that. There were two stands that were worth visiting because their products are, I feel, significant. The first stand was Mitac, in an obscure corner of the business section. they had an incredibly cheap 386 micro (1800) running a transputer card, and driving a Mitsubishi 19 inch EGA monitor. Now, transputers are one technology where Britain leads the world, but if we don't invest in them heavily, the Americans will take away that lead. However, that 19 inch monitor I could really use.

The second stand that impressed me (and I don't know if I should say this in a Commodore magazine) was the Acorn stand. Archimedes uses the same basic RISC technology as the transputer, and it doesn't half shift. However I think Amiga is better. At the end of the day, what counts is boxes out of the door, and Acorn just doesn't have the marketing power to compete in the global marketplace.

Back now with the 'good guys'. Commodore had a 'village' in what was ostensibly the National Hall restaurant. It was a nice parochial affair, tucked away in a little backwater. I guess people can't help comparing it with Atari's "world", noticing the vast difference in size, vendors and popularity. I reckon Commodore need to get out of their 'village mentality'. It takes more than a village and a football team to conquer the world.

Speaking of football, I guess everyone knows that Commodore have spent 1.2 million in sponsoring Chelsea. During the show, 'selected guests' were invited for a tour of the ground and a pep talk by this month's CBM top management. Whilst being 'peped', I spoke to Mike Hambley, Commodore's Technical Support Manager. The newly launched PC-1 is, it seems, an Amiga A2088 Janus card turned on its side with a display adaptor, ports, keyboard and disk drive bolted on. Further interesting possibilities are opened up by the fact that the disk expansion socket is the same as the Amiga disk socket. While no expansion slots as such, there is an 'expansion connector' that looks remarkably like the male version of a slot. So all you need is a gender bender. Unfortunately, Mike was unable to confirm this supposition at the time.

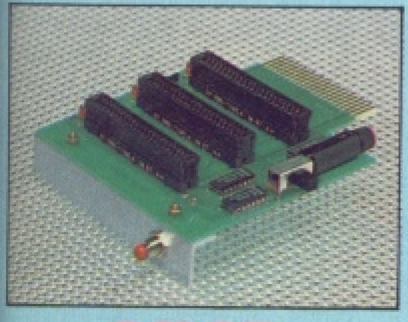
Commodore raved about their new range of brochures, that were not actually available to the public. The A2000 brochure was their pride and joy, and yes, it was impressive. Get one off Commodore and start dreaming. the A2000 may be Commodore's new flagship, but the beloved C128 is notable by its absence. When asked, the Commodore reps just changed the subject. I hope it was purely oversight, because I'd hate to see the C128 dropped.

As I'm about out of space, it really just remains for me to thank, on behalf of the exhibitions organisers, all those volunteers who helped on the ICPUG stand, and everybody who turned up or otherwise contributed towards making PCW a very enjoyable event.

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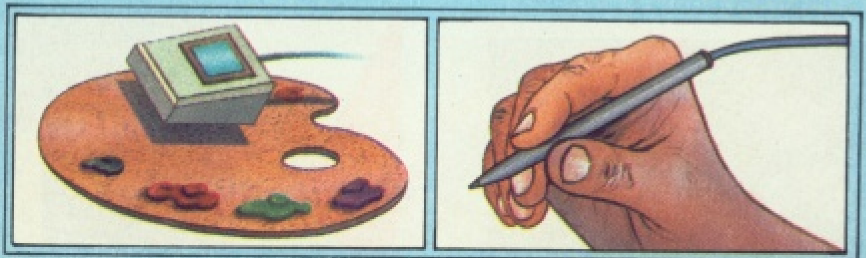


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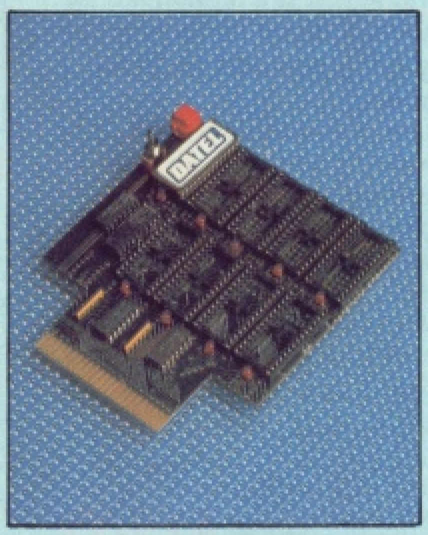
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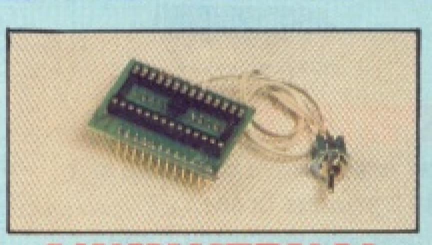
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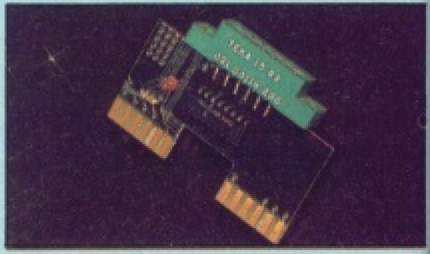


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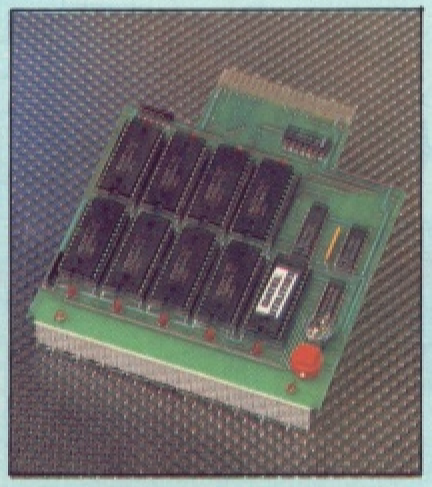
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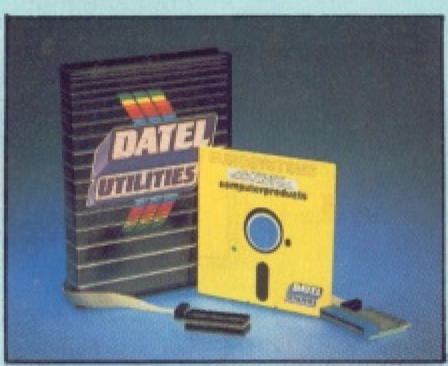
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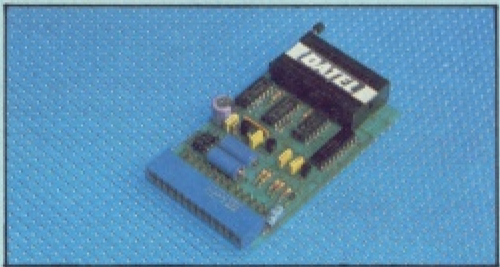
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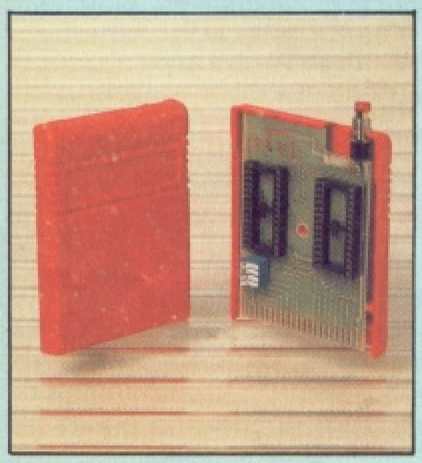
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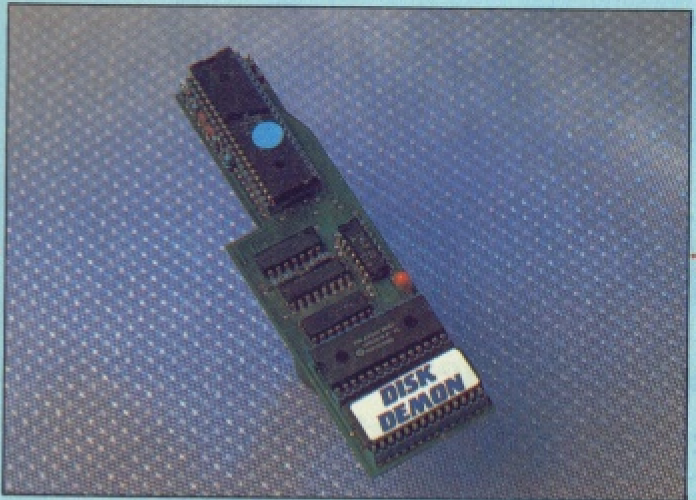
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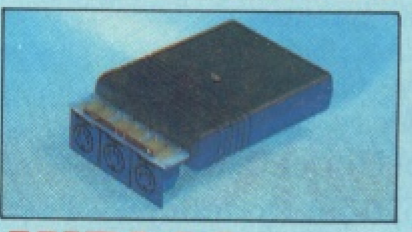


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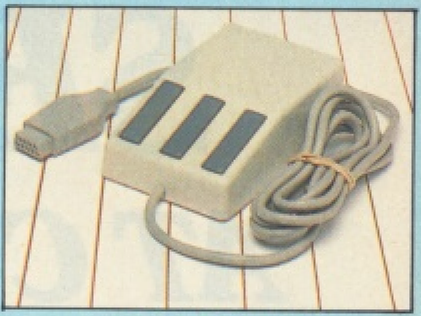


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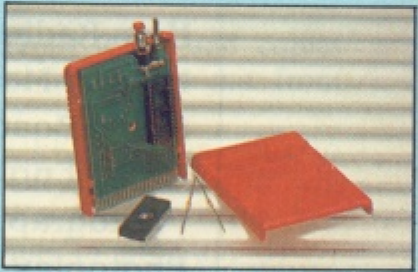
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Ultra Function Keys

Use the function keys to store seven screens of instructions without limiting your Basic memory!

By Geoff Hackworth

Commodore blessed the C64 with eight function keys, but in their infinite wisdom, they totally neglected to include any support system. My program provides such a system which allows you to store data which can be recalled to the screen at will. Before you say that you've seen all this before, look at the size of the program and you'll realise that it is no ordinary function key utility.

Most programs will only allow each key to produce a string of about eight characters. With this program you can store up to 998 characters on each of the first seven keys, the f8 key being reserved for the UFK Editor. The Editor allows you to 'program' the other keys and view a 117 character description of the task stored on each of them.

The Editor is very simple to use and is very similar to the screen editor built into the C64's operating system. Most characters may be stored by the Editor except for the colour and RVS ON or OFF symbols. There are also some special symbols for use within the stored data which perform specific tasks.

All the information stored on the keys may be saved and reloaded by two simple SYS commands.

Storing 2Kb of information may seem a bit memory consuming but the machine code and its variables are stored from 49152 to 53105 and the descriptions are stored under the Basic ROM. This means that normal Basic memory is still available for developing your own programs.

Getting It In

The program is presented in the form of a Basic loader which simply has to be typed in, saved and then run. Apart from the *Your Commodore* checksum, the program contains its own data check which will indicate any line in which an error has occurred. If you find any errors, correct them and then save the program again.

So that you don't have to use the Basic loader every time you want to use the UFK option, you may use a small save routine within the program itself. SYS52803, "ULTRA",1,1 for cassette (,8,1 for disk) will do this for you. To reload the normal LOAD "ULTRA",1,1 (or ,8,1) command followed by NEW after loading has been completed.

Using the Program

To initilise UFK, type SYS49152 and press RETURN. The screen will change colour, clear and then ask if you want to clear the data in the function key and description areas. At this time the memory just contains garbage so the correct response is 'Y'. The original screen display will return and a message indicates that UFK is now operative. Every time UFK is called, it stores the current screen display under the Kernal ROM and copies it back again when you exit from UFK.

Once in UFK you can start to program the keys. Pressing f8 will call up the Editor. Select the key which you want to program (f1-f7) or later you can press f8 again if you want to view any descriptions which you have already defined.

For now, press f1 and the screen will clear except for a reverse field full stop beneath the cursor at the top, left-hand corner of the screen. This full stop is the end marker which is always used to indicate the end of a definition. Even when there is nothing defined for a particular key, this symbol should be present.

Start at the current cursor position, you can now start to type in your new definition but remember that the last two spaces on the screen cannot be used. One space will be needed for the end of definition marker (the reverse full-stop) and one space to prevent the screen from scrolling up and losing the data on the top line or two. This is a necessary compromise to avoid having to use a sophisticated (and much longer) screen editor program.

Now you can try a simple demonstration of the Editor's capabilities. With the cursor in its home position, type PRINT "A TEST" and press the RETURN key. In normal use you would expect this to result in the system printing

Table 1

Reversed Character	Function within definition	Called by pressing
?	Input request	f1
.	End marker	f2
£	Await key press	f3
D	Delete character	f4
S	Home cursor	f5
♥	Clear screen	f6
<	Return	RETURN
←	Shifted return	SHIFT/ RETURN

A TEST onto the screen. In Editor mode this doesn't happen, the cursor simply prints a reversed 'less than' symbol as though it were just another character. Now type PRINT 4*5 and press RETURN again. This should apper on the same line as the last command.

This is as far as the current definition will go but, as you can see, a lot more information can be stored on the screen, even more than can be stored on a normal C64 screen.

To end this definition a full stop must be placed after the last return symbol. Press f2 and you'll see this happen and then press f8 to quit the editor. The old screen will be restored and everything looks normal until you press the f1 key. When you do, the words PRINT "A TEST" appear and, instead of the symbol appearing, the return is executed and the words A TEST appear as if you'd pressed return yourself and the READY prompt underneath them. Before the flashing cursor appears, the formula PRINT 4*5 then appears, under this the result 20 followed by the normal READY prompt.

The only time you don't have to end a definition with the reversed full stop is when the definition fills all 998 characters on the screen. In this case leaving the Editor with the f8 key will automatically place the symbol at the end of the definition.

There are several other embedded commands and how they can be used within a definition are summarised in Table 1. All of them are reverse field characters so from now on they will be referred to without reference to their reversed out nature.

Inside the Editor, the CLR and HOME keys work as normal and will clear a written screen of an unwanted function key definition or return the cursor to the top, left-hand corner of the screen. Within a definition you may want to clear the screen or home the cursor for a special purpose so, to facilitate this, there is a special character for each purpose. The 'S' or home command is obtained by pressing f5 and the heart symbol is held on f6.

Before these commands are executed, you'll probably want to halt the function key output so the '?' and '£' have been utilised to allow user input or await a key press.

The question mark is a very powerful feature which allows the user to INPUT fresh data. This allows the user to type in up to 37 characters in length. When the definition printout reaches this symbol, the computer pauses and awaits your input. One use for this is to enter a text output such as the word LOAD" followed by the question mark, another set of quotation marks and the return symbol. In operation, the program will wait for an input after printing LOAD", it will wait for a filename to be typed in from the keyboard until you press return. The end quotes will then appear and the LOAD command executed. The quotes could also be followed by ',8' for a disk command or ',1,1' for a machine code tape load. If you do load a machine code program make sure that it doesn't use the same memory area as the Editor!

Once an input string has been defined it is stored for use the next time. When the definition pauses for input this last input can be repeated by holding down the shift key and pressing RETURN. If you don't want to input anything at any time, use the delete key to erase to the beginning of the input line and press RETURN. If this means that a syntax error will occur, an error message will appear on the scren but the execution of the f-key definition will continue.

Sometimes syntax errors will occur within a definition due to programming errors. If this happens at any time the function key printout can be halted by pressing RUN/STOP. The computer responds by printing '*** ABORTED ***' and halting execution.

The '£' symbol means that the computer will wait for any key to be pressed before continuing. So if a command such as PRINT "A TEST" has the '£' symbol before the return, the command will not be executed until a key is pressed. The border also flashes as a visual indication that a key press is required.

If the symbol follows a return symbol a space must separate the two commands. This means that a space will be printed which may not be desirable. It is easily remedied by placing a delete symbol,'D' after the '£'.

Some definitions may not fill a line and may not be direct computer commands. For example, you may want to include game instructions on the f1 key. Normally the text would have to be padded out with spaces to make it fit the screen. This is wasteful of memory so I have included a shifted RETURN symbol. When this is used it operates as it would in normal operation mode, everything on the line is ignored by the operating system and no syntax error occurs.

One extra use for the UFK program is to use it as a pre-loader for a program of your own. Text screens and commands can be stored on the keys and the procedure would be to use the f2 key to load the program, the f1 key to run it and all of the remaining five keys can hold the instructions. At the end of the game or utility, the function keys can be used by the next user to re-read the instructions and run the program again.

The key definition information store is used like a REM statement in Basic. The function of each key can be encapsulated in 117 characters so that you can easily check to see what the key is programmed to do. If you then don't use the particular set of definitions for some time after you created them, then you can easily recheck to see what was their original purpose.

The definitions can be viewed by pressing f8 to enter the Editor and pressing it again. You now have another choice to make – press any other function key to read its description or press f8 again to view all of the definitions in rotation. Whenever you view a description you are asked if you want to edit it. If you press 'N' the next description will be revealed or you will return to the Editor if you press 'Y', editing may proceed in the same way as editing the data stored on the function keys. The only difference is that the RVS ON and OFF symbols are functional.

After entering the new definition, you can press RETURN to return to direct mode or move on to the next definition.

Table 2 outlines some of the SYS calls which may be used in preparing definitions. For example, SYS49161 could be used as part of a definition where there is a danger of an illegal entry being executed.

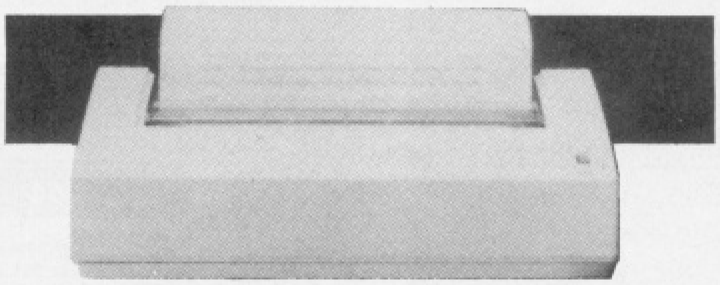
Imagine that a defination has a calculation where an attempt may be made to divide a number by zero. This is an illegal function so inclusion of a line similar to IF C=0 THEN PRINT "DIVISION BY ZERO ERROR": SYS 49161. The next line of such a program would be PRINT C/100. If an error occurs the function will abort before this division is reached.

The UFK Demo program demonstrates key definitions and descriptions which will help you to practice using the UFK Editor. YC

Table 2

SYS Command	Function
SYS49152	Initilise UFK
SYS49155	Call the Editor
SYS49161	Abandon data Output
SYS49164	Wait for key press
SYS49167,"filename",(device number),1	Save key definitions
SYS49170,"filename",(device number),1	Load key definitions

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Games Reviews

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HYBERBLOB

In the intelligence stakes, blobs rate somewhere between Leeds United supporters and games reviewers, i.e. almost zero. But nevertheless, they are entitled to their summer holidays just like anyone else. It is just your unlucky lot in life that it is up to you to look after them.

After carefully scanning the glossy brochures, you decide that Cubos is the place to take them – 100 screens paved with squares. When you arrive there though, you find to your dismay that the brochures must have been written by the same people who advertise Spanish hotels. Nothing is quite finished.

As already mentioned, blobs enjoy the simple pleasures of life. All they want to do is bounce gently from the left hand side of the screen to the right. All you have to do is to make sure that there are no holes for them to bounce down and no obstacles blocking their paths. This is done by picking up and repositioning the paving blocks. Up to four can be carried at any given time and all that remains is to rebuild the place within the given time limit.

This is an original game that requires quick thought and quick action. The screens get progressively harder but they all look the same so that this is only really going to appeal to puzzle fans.

G.R.H.



Touchlines:

Title: *Hyberblob.* ***Supplier:*** *Firebird, First Floor, 64-67 New Oxford Street, London, WC1A.* ***Tel:*** *01-379 6755.* ***Machine:*** *C64.* ***Price:*** *£2.99.*

Originality: *8/10.* ***Graphics:*** *5/10.* ***Playability:*** *7/10.* ***Value:*** *8/10.*

THUNDERFORCE



Oh dear! It's yet another horizontally scrolling, beat the living daylights out of anything that moves, type of game. And from Hewson too who have a reputation for originality. Admittedly it's only a budget price but even so, there must still be a streak of originality left somewhere mustn't there?

For anyone still reading the review, the scenario goes something like this. You and your partner have discovered some secret information about some underground chemical factories. Your discovery was not without peril though and, you were captured by the bandits who were running this illegal concern.

Imprisoned at the bottom of a very deep dungeon, you have managed to escape from your cell (how isn't made clear) and you're now trying to escape by running the gauntlet past some guards, both human and alien as well as some deadly sledges. To start with, you are armed only with your fists and your guards, being of a sporting nature, decide not to shoot you but thump you back. As you progress through the levels, you get the chance to pick up various weapons which have been carelessly left lying around – a gun, shield, stone, ball and boomerang. Your escape naturally has to be made within a given time limit but again, you have no idea why.

Graphically, the game is OK but as far as gameplay goes, the only unusual feature is that two of you can play together. Come on Hewson, you can do better than this. **G.R.H.**

Touchline:

Title: *Thunderforce.* ***Supplier:*** *Hewson Consultants, 56B Milton Trading Estate, Milton, Abingdon, Oxon OX14 4RX.* ***Machine:*** *C64.* ***Price:*** *£2.99.*

Originality: *1/10.* ***Graphics:*** *7/10.* ***Playability:*** *5/10.* ***Value:*** *3/10.*

TALLADEGA

Stock car racing is the name of the game in this game endorsed by Richard Petty, one of America's leading exponents of the art.

Choosing from either the standard oval track or a randomly constructed one, your first task is to qualify for the race itself. Controls are a fairly standard left, right, accelerate and brake and there is also a turbo boost which can only be used when you are at full speed although using it is somewhat heavy on the petrol supplies.

What is unusual for a racing game is that one crash and that's it, you're out of the race. An excellent way to stop you putting your foot down and bouncing off your rivals; a feature of certain other racing games. You are allowed to nudge your rivals tactically out of the way however. Other factors that you have to keep your eye open for are engine failure, duff tyres and low fuel. Any of these requires a visit into the pits. You don't have to do anything special here apart from indicate what you want repaired and watch the clock tick by.

Despite some jerky scrolling, Talladega proved to be highly playable and at under two pounds, is not going to break the bank. **G.R.H.**

Touchline:

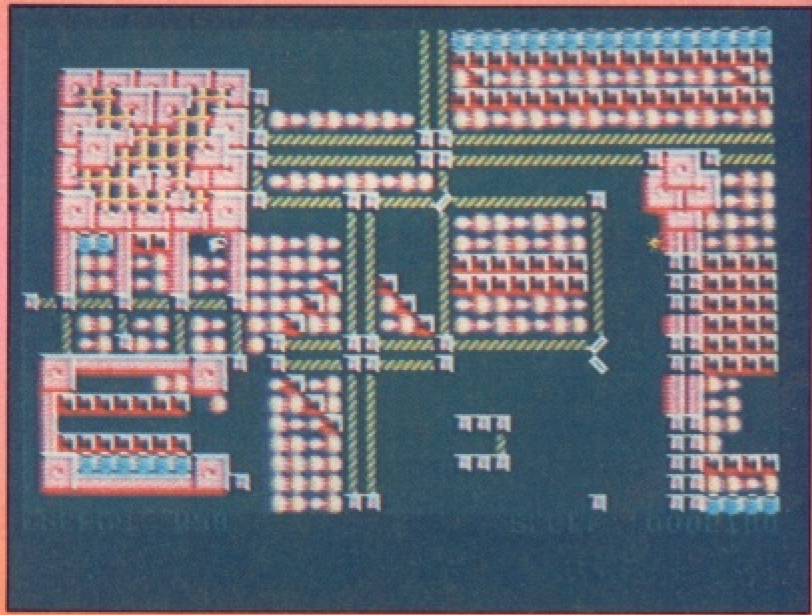
Title: *Talladega.* ***Supplier:*** *Top Ten, MIL, 12 Chiltern Enterprise Centre, Station Road, Theale, Berks RG7 4AA.*



Machine: *C64.* ***Price:*** *£1.99.*

Originality: *5/10.* ***Graphics:*** *6/10.* ***Playability:*** *8/10.* ***Value:*** *8/10.*

SPORE



After an accident in a biochemical laboratory, you are the person selected to retrieve the antidote. Genetically altered spores are running riot and, as luck would have it, the only supplies of the antidote are hidden deep within base.

Spore is a Gauntlet clone in so much as it is a top down view of each sector with generators churning out spores as fast as they can. There are a number of bottles in each sector which must be collected before progressing. Other items include extra energy supplies and temporary invulnerability potions.

The spores and generators are contained by a series of electrical barriers which, although impenetrable, can be switched off. The barriers can also be shifted by shooting at some two way mirrors. This is all well and good but in practice, after the first few tentative games, you tend to ignore all this and just wade in guns blasting.

Spore is a highly enjoyable budget game, ideal for a quick half-an-hour thrash and should you manage to save

the universe, there is always a screen disaster for you to play about with, so it won't be quite so easy the next time.

G.R.H.

Touchline:

Title: *Spore.* ***Supplier:*** *Mastetronic (Bulldog label) 8-10 Paul Street, London, EC2A 4JH.* ***Tel:*** *01-377 6880.* ***Machine:*** *C64.* ***Price:*** *£1.99.*

Originality: *7/10.* ***Graphics:*** *6/10.* ***Playability:*** *9/10.* ***Value:*** *8/10.*

BLACKWYCHE

Do you remember arcade adventures? They were all the rage a couple of years ago but seem to have died a death recently, to be replaced by Gauntlet clones and beat-em-ups. One of the top producers then were Ultimate and their games have seen a new lease of life by being re-released by Mastertronic at a budget price.

Blackwyche is a series of games featuring Sir Arthur Pendragon. Our hero has just discovered a ghostly ship and finds himself inexorably drawn towards it. Boarding the Blackwyche, Sir Arthur finds himself in the Captain's cabin. The logbook shows that Captain Cavendish and his crew had discovered the legendary Crystal Skull of Souls. The power of the Skull had proved too much for them though and in one last desperate message in the logbook, Captain Cavendish pleads for someone to come and release his soul which is hidden somewhere on the ship.



Sir Arthur must explore the ship, depicted in a raised 3D perspective, finding various items and then working out what to do with them. First priority has got to be finding the sword as without it, life is going to be very short indeed. Patrolling the ship are a series of ghosts, skeletons and flying octopusses. Contact with any of these creatures drains some more of your precious life blood. Some creatures, those that materialise and fly towards you can be killed but others, usually those protecting something important prove to be immortal and have to be dodged.

The game does look rather dated now with some very blocky graphics. The C64, unlike the Spectrum, does not really lend itself to games of this type and even at budget price, you may want to try before you buy. **G.R.H.**

Touchline:

Title: *Blackwyche.* ***Supplier:*** *Mastertronic (Ricochet label) 8-10 Paul Street, London EC2A 4JH.* ***Tel:*** *01-377 6880.* ***Machine:*** *C64.* ***Price:*** *£1.99.*

Originality: *6/10.* ***Graphics:*** *5/10.* ***Playability:*** *6/10.* ***Value:*** *6/10.*

BOBSLEIGH

If you think that bob is just a name for somebody called Robert or that the Cresta Run is a drink, then perhaps you're not quite ready for the bone crushing, skull smashing winter sport of Bobsleigh. Will you be ready to lead the British challenge at the Olympics in Calgary? Probably not, but you'll have fun trying!

Your first problem once the game has loaded is to get a bob but since your sponsors have only coughed up £12,000 in cash you are forced to pick the cheapest, which unfortunately, is also the slowest. You also have a team who are desperately unfit and must train hard if they're going to stand a chance.

Training the team costs £600 and means a few seconds of frantic joystick waggling which will improve your team if you waggle quickly enough. As your fitness improves so does your strength to push the bob to start your run. This involves more joystick waggling but the maximum speed you can reach depends on your fitness. So if your computer fitness is poor no amount of waggling will improve your speed.

Once you've pushed off the race enters the second phase as you guide your bob down the course, riding the banks to gain speed and avoiding the walls that will slow you down and damage the bob. If you survive the trip down the 3D track you'll get a time and maybe even some championship points.

Bobsleigh isn't just about training and racing as you also have to survive and improve your chances by managing your



sponsorship cash. If you spend money on training you may win more races and get more sponsorship but if you crash or hit the sides of the run and damage the bob the repair bills could bankrupt you and end your quest for gold. T.H.

Touchline:

***Title:** Bobsleigh. **Supplier:** Digital Intergration, Watchmoor Trade Centre, Watchmoor Rd., Camberley, Surrey, GU15 3AJ. **Tel:** 0276 684044. **Machine:** C64. **Price:** £9.95.*

***Originality:** 7/10. **Playability:** 7/10. **Graphics:** 6/10. **Value:** 7/10.*

BASIL THE GREAT MOUSE DETECTIVE



The scene is 221B Baker Street. In the basement stirs Basil the greatest mouse detective in all of Mousedom. Unfortunately, his latest case has led to the kidnapping of his friend Dr Dawson who is now in the evil clutches of Professor Ratigan.

To rescue your chubby friend (and incidently solve the case) you must track down the evil Professor by collecting clues that will lead from the shops and docks of London through London's sewers and into Ratigan's den.

These clues are found in neatly packed cylindrical containers that are spread throughout the ladders and ramps of the games screens. However, the fiendish Ratigan has sneaked in eight extra containers complete with false clues. Therefore, whenever you have collected five clues you must press the ? key which will tell how many correct clues you have! If you haven't got five it's up to you to find out which ones are the red herrings.

In addition to the clues you can also find cheese to top up your energy which is lost by contact with Ratigan's minions and mousetraps that can be dropped to trap these nasties. T.H.

Touchline:

***Title:** Basil The Great Mouse Detective. **Supplier:** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS. **Tel:** 0742 753423. **Machine:** C64. **Price:** £9.99.*

***Originality:** 6/10. **Playability:** 8/10. **Graphics:** 6/10. **Value:** 8/10.*

RADIUS

The Radius is the most important hyperspace transport route this side of the Sanvolgrani Rift and it's been taken over by aliens. Now you, the bravest, fastest and toughest pilot in the Universe must get it back by taking on the aliens in your Ripley Class Hunter Killer Fighter.

The Radius looks like any other backdrop for this type of standard shoot'em up with aliens attacking in a series of unrealistic attack waves from those that come at you in an easy to blast straight line formation to a guaranteed life losing reverse assault.

The result of all this is an unimaginative but annoyingly difficult game to play but, all is not lost, as the game also contains a painter game that you can play while loading and a sub game that's better than the main game. T.H.

Touchline:
***Title:** Radius. **Supplier:** Players, Mercury House, Calleva Park, Aldermaston, Berks RG7 4QW. **Machine:** C64. **Price:** £1.99.*
***Originality:** 4/10. **Playability:** 6/10. **Graphics:** 5/10. **Value:** 4/10.*

ZIG ZAG

Zig Zag is a 3D, four way, diagonal, scrolling game in which you play a trainee star pilot who must face the ultimate test, the Matrix of Zog! The maze was created to find the ultimate star pilot and although countless hopefuls have tried, none have succeeded in collecting the Eight Crystals of Zog. Now it's your turn.

The maze consists of 1,400 3D screens through which your ship must fly and fight off the constant onslaught from the attacking maze aliens. Your ship flies along just above the floor of the maze and can only turn around corners by colliding with pyramids that then deflect the ship in a new direction. If you hit a wall you just bounce straight back.

To get around the maze you will have to trigger a series of switches by flying over them or shooting them with your laser that adds new prisms so you can turn around new corners.

You can improve your chances further by gathering credits for every alien you blast. These can then be cashed in at the shop for useful objects such as missiles, shields, infra-red vision, maps of the maze and smart bombs. Pick the right objects and use them well and you may live long enough to reach a save zone that allows you to restart a game from part of the way through the game, infra-red zones that remain blacked out until you buy an infra-red system for your ship and timelocks that must be passed before they close and seal you in forever.

The result is a game that requires a combination of shoot 'em up, mapping and arcade adventure skills. Finally, a hint. If you're going to map the game start in the bottom right hand corner and get a BIG piece of paper! T.H.

Touchline:
***Title:** Zig Zag. **Supplier:** Mirrorsoft, Athene House, 66-73 Shoe Lane, London EC4P 4AB. **Tel:** 01-377 4645. **Machine:** C64. **Price:** £9.95 (Ca) £12.95 (Disk).*
***Originality:** 7/10. **Playability:** 7/10. **Graphics:** 7/10. **Value:** 8/10.*



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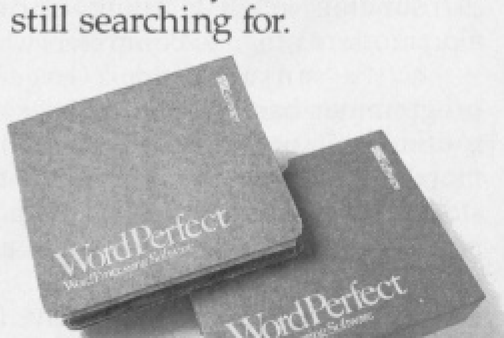
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Relative File Programming

Learn the correct method of using relative files by following our series. We kick off with relative versus sequential files

By Eric Ramsay

There is alot of mystique surrounding relative filing on the Commodore range of computers whch is quite unjustified. Once a programmer has built up a library of routines, relative filing is only slightly more difficult than the sequential storage method but it is far more powerful, much more flexible and quicker in data retrieval.

As a challenge I began relative file programming on the Commodore 64 and have several programs which run very efficiently. Of course, with the new BASIC 7 of the Commodore 128, relative file programming is much easier.

In this series of articles, I hope to show you that when storing large amounts of information you should think automatically of relative files rather than the sequential method. I shall include every routine necessary to set-up, read, write sort, search and even delete from relative files of your own.

Let us look at the two ways of storing the data and compare them.

Sequential Files

If you have used BASIC at all on your Commodore you will probably be familiar with sequential files. In fact, a LIST is a Sequential File of a BASIC program, stored on a disk or a tape cassette. If you have only a datassete, the only means of databasing available to you is a sequential file, but hang on to these articles: you will surely have a disk-drive before long!

Storing the program data from a database is one of the most important questions to consider at the outset; but the question is, which to use? Let us look at the sequential file. Normally, used either on tape or disk drive, this type of file stores the information FIELD by FIELD, one after another continuously until the end of the File. Normally, the information necessary to collect the data back from the File is given first, i.e.

Name of FILE
Number of FIELDS
Number of RECORDS

These variables are followed by the file data, one after another. The program would read the essential information, number of RECORDS and Number of FIELDS, and then use a nested LOOP to read the data back into string arrays inside the computer memory. This method is a simple but effective method of storing the information contained in a database.

Then why not use it? For a small DATABASE of course, this method is quite satisfactory. However, the main disadvantage is its simplicity; the data is stored sequentially on the medium.

(either tape or disk) and therefore must be read from beginning to end.

It is not possible to go immediately to RECORD number 1170, for instance: you must read through all the data until number 1170 is reached and then use it. Suppose there are 7000 RECORDS? The time taken to access a particular RECORD would be enormous, particularly if using tape. If you have just the datassette then you are stuck with this method.

In order to avoid constantly reading through the data, most sequential files read all the data into the RAM of the computer once, at the beginning of the program, and then write the updated data back into storage right at the end of the program. This is still effective and simple, so what are the problems?

The limitations of sequential files can be broken down into the following:

File size – since all of the data has to be read into memory to reside in the computer while the program is running, then the size of the file is limited to the RAM in the computer, which is expensive of memory and can affect the processing speed and 'Garbage Collection' considerably.

Efficiency – all of the RECORDS are contained on the storage medium in one lump, as it were, and cannot be accessed (looked at) one at a time. This means that the RECORD DATA must be kept in RAM.

Fragility – while the program is running, all the new RECORDS and the updates are in RAM only. A single power-cut, even for a second would be enough to lose all the new data. The system is 'fragile' and such an event or a computer 'crash' because of inefficient error-trapping would lose what could be hours of work.

Storage – since all the data is written onto the medium in one operation, the storage is fragile; if there is a problem with the Data write, the operation will continue regardless, but the next time the program is RUN the File Data will not load properly. Result – a system crash and all the previous work is useless because the Data is unobtainable.

So, despite the ease and simplicity of sequential file programming, we shall consider instead the merits of the relative file type.

Relative Files

Is relative file programming really worth all the extra effort of programming? The advantages over the Sequential File can be summarised as follows:

File Size – the relative file RECORDS are written individually on the disk, so the relative file size is not dependant on the computer memory but the limitation of the relative file size permitted on the 1541 or 1570/1 disk-drive. In all cases, strangely, this limitation is 167132 bytes (even on the 1571 double-sided drive).

Efficiency – because each RECORD is placed in its unique position, each can be accessed with one operation controlled by the program. It is no longer necessary to read through the whole file at the beginning of the Program RUN.

Fragility – because the RECORDS are written individually on the disk storage medium a system crash or power failure does not mean the loss of any data except the very last RECORD write-operation.

Storage – since the RECORDS are written as they are entered, any problems effecting the write operation would be signalled at once and would only effect that single RECORD.

There is an advantage – massive file sizes are available, each RECORD can be accessed immediately, the system is much less vulnerable to crashes through error or power-failure. There is a price to pay, of course. The maximum relative RECORD size permitted is 254 bytes (characters, including spaces and separators, more of that later).

So the relative file has advantages over the sequential, but has to be programmed more carefully to take full advantage of the facilities. We'll now look at the relative file programming theory.

I have assumed that you already understand the usual statements: PRINT, INPUT, GET, OPEN, CLOSE, and the new BASIC 7 DOPEN and DCLOSE. You should also have a working knowledge of strings, arrays and variables. If not, perhaps you would be as well to study a short course of BASIC programming first.

Once you have worked through this series you will have a library of BASIC routines to enable you to program a relative file for any purpose, either a full-blown database or a simple relative file. Whichever is required, the methods and program routines needed remain the same.

Let us take a quick look at the theory of relative filing. Instead of the data being stored in a huge lump on the disk surface ready for reading into memory, the data is written into suitable RECORDs separately onto the medium. The later versions of BASIC have DOS commands which calculate the correct positioning of the read/write operations automatically. Don't despair 64 owners, I shall cover your machine as well.

Here is a simple example. Suppose we need to write a relative file for a disk file. The one I use for my disks has over a thousand program names stored on it! For disk filer, which after all is a sort of database, all we need to do is to calculate the length of the RECORD as it is placed on the disk. What information do we need on each RECORD?

Well, we need the number of blocks, the name of the file on the disk, the type of file and the name of the Disk. So the RECORD would look like this:

File Size	File Name	File Type	Disk-name
3 chars	18 chars	3 chars	8 chars

The database therefore has four fields and a total length of 32 characters. Since each character occupies one byte of disk space, the RECORD length is 32 bytes. Easy, so far, isn't it?

There must be one more charactrer on the RECORD than is actually used, so the RECORD length must be shown as 33 bytes.

Now we have to look at the question of separators. Quite simply, there are two ways we can write and read a RECORD in a relative file. We can write the RECORD in one go using a single string, which is the fastest method, or we may separate the FIELDs with a carriage return, a CHR$(13). Why would we do that?

Let's look at the above example again. The total length of the RECORD is 33 bytes. This can be read in one single operation without any buffer problems. (Remember a single string of 88 characters can be read by the Commodore 64, or 160 for the 128.)

A string can be added together to a total length of 256 characters, but such a string could not be INPUTted in one read because of the buffer limitation. In our case, the length of the RECORD enables us to read the entire record in one operation. I shall be looking at the question of separators in the next article of the series.

The other use of separators is to stop the read of a FIELD within a RECORD. This is really only useful if the length of each FIELD is varied throughout the file. In our case we are going to ensure that each FIELD is exactly the same length, so separators are not required.

Now we know the length of the RECORD we can determine the permitted number of RECORDs in each file. This limitation is imposed by the DOS, and is a total file length of 167,132 bytes. So the permitted maximum number of RECORDs is 167132/33 = 5,064. Since we will be using the routine for different purposes then we shall declare that as a variable, i.e. AVAIL=INT(167132/33).

We are allowed a total of over 5000 RECORDs in the file. Now we can examine ways in which we would OPEN the relative file. In BASIC 7 this could not be easier. If we declare a variable 'LREC' as the length of the RECORD then we open a File with the simple command:

dopen # 5,"flier",l(lrec),d0,u8

What? Was that it? Yes. But let us look at the RECORD length again. We also need the FIELD pointers, i.e. the place within the RECORD where each FIELD begins. We will need these so that we can display the RECORD and print it out. It would be a bore to work those out, so we could use a FIELD pointer routine to do this for us:

```
3520 rem **** calculate field pointers
3530 lrec=1: REM ** declare length as 1
3540 for a = 0 to c: REM ** C is number of FIELDS
3550 lrec = lrec+field(a):REM** add field length to LREC
3560 fpoi(a+1)=lrec: REM ** declare field pointer
3570 next a: REM ** end loop
3580 fpoi(0)=1:REM ** 1st FIELD pointer is always 1
3590 return
```

This routine works for any number of fields in a record. It will work out the total length of the RECORD and the FIELD pointers for each provided that the length of each field is stored in the array FIELD() beforehand. For creating a database, the FIELDs may be any length and any number within a RECORD. If the length of the RECORD is greater than 160, however, an additional routine must be included to allow for the use of a single separator, so that the RECORD may be read back.

```
3584 iflrec< 159then3590
3586 lrec=lrec+1:rem *** allow for separator
3590 return
```

Owners of C64 may need even more lines, depending on what sort of write routine you intend to use. More about that later. Instead of the lines shown above, you will need the following:

```
3584 iflrec< 88 then 3590
3586 lrec=lrec+1:rem *** allow for separator
3588 if lrec < 176 then 3590
3589 lrec=lrec+1:rem *** allow for 2nd separtor
3590 return
```

I would suggest a loop to INPUT the names and lengths of the FIELDS like this:

```
100 input"Number of Fields Required?";c
110 c=c-1: rem **** the Loop starts at 0 so c=c-1
120 fora=0toc
130 print"Name of field"a+1
140 inputfield$(a)
150 print"Length of Field"a+1
160 inputfield(a)
170 nexta
180 iflrec > 254 then go to edit routine:rem ** check for maximum RECORD size.
180 gosub 2410:rem ** now set up the File
```

You may consider standardising the lengths of the FIELD names to, say, ten characters to make it easier to display them on the screen later, like this:

```
165 field$(a)=left$(field$(a)+"          ",10)
```

However, if the RECORD length LREC is greater than 254 bytes, since no RECORD can be longer than that, then the FIELDs will have to be edited until the RECORD as a whole contains less than 254 bytes. It is simple to GOSUB to another routine which displays the FIELDS and requests which one to edit.

Opening a Relative File – BASIC 2

No, C64 owners, I haven't forgotten you: you need the BASIC 2 version of opening a relative file. Your DOS does not take on much of the work for you, but provided you follow the general layout of these lines you shall be able to adapt them for your own programs. You would OPEN the relative file with:

OPEN5,8,5,"FILER,L"+CHR$(LREC)

Once the relative file has been opened, it can be used for both reading and writing RECORDs, another advantage over the sequential file, which can only do one or another and not both.

You would have to open the error channel first in order to read for Disk errors:

OPEN15,8,15

Dealing With Errors

Now we have started using the DOS commands, we will need to check the error channel of the drive every time we access the relative file. You would think that this would slow the program down, but surprisingly it seems to be the reverse. Because the error channel is constantly checked at every read/write operatin you will find that the program runs much more smoothly and without errors. This is especially important because in relative files the DOS is working that much harder.

With BASIC levels higher than the measly 2 of the C64, you might have a DS assignment. The Plus 4 and certainly the 128 have, and we'll look at this first.

The DS and DS$ Command is the built-in disk error command which can be used in direct or program mode. Simply typing ?DS$ and pressing the RETURN key will read the Disk Channel and give a result, normally:

00,ok,00,00

If there was an error, the DS command will clear it and turn off the error light which would have been flashing on the drive.

It is the first number '00' which we are primarily concerned with. This first number is the error number, which we can use to take appropriate action.

The first thing to detect is, of course, that there is no error, and then to return to the main routine as soon as possible. Error numbers less than 20 are not true errors and may be ignored; the error number 01 for instance is an indication that files have been scratched.

So we will ignore errors less than 20 with the very first line of this Error-Check sub-routine:

```
3600 rem **** disk error check routine
3610 if ds < 20 then return
```

If we are writing to a RECORD which has not yet been set up, the DOS will actually create it for us without

intervention, so we shall ignore the error number 50: 'Record not Present'.

```
3630 if ds =50 then return
```

Of course, while writing for yourself, you may wish to check other errors, such as the error 71, directory error which can be corrected with a collect or validate command. (Yes, contrary to common belief, you *may* use collect or validate with relative files. Since the DOS of the drive sets up the relative file and does its own housekeeping, there is no danger of the validate or collect command erasing the file. The warning about validate or collect applies to random access files, which is totally different.)

```
3620 if ds =71 then collect:return
```

You may also like to display any real error on the screen and then returning to the Menu, such as:

```
3640 print ds$:dclose:getkeyzz$:goto
80:rem ******* return to menu or
STOP, whichever you prefer.
```

All we need to remember now is to GOSUB to this sub-routine after every read and write operation.

Disk Error Checking – BASIC 2

The poor old BASIC 2 of the C64 can do the same, but in a much more long-winded fashion. The C64 uses the same error-numbers but there is no DS$ command. We also have to ensure that we have opened the Error Channel 15 first. Most people prefer to use the same file and channel numbers, hence the 'OPEN 15,8,15' above. Since we have neither the DS$ or the DS command, we have to INPUT the error channel number from the File no 15 on the channel 15 already opened. We do this with the first line of the sub-routine:

```
3600 rem **** disk error check routine
3610 input # 15,er,er$
and then we can continue with the
remaining checks
3615 if er < 20 then return
3630 if er =50 then return
3620 if er =71 then print # 15,"V0":
return
```

Now we can add the error check sub-routine to the open file routine of the program:

```
OPEN5,8,5,"FILER,L,"+CHR$ (LREC:
GOSUB 3610
```

and for the 128,

```
DOPEN  5,"FILER",L(LREC):
GOSUB 3610
```

Now we have the relative file opened and the error-checked, now we have to create the RECORDs to write to.

Setting Up – BASIC 3.5 +

The DOS will write to each RECORD whether it has been created or not, because we have 'written-out' the DOS error, RECORD NOT PRESENT. However, this is not the most efficient way of doing it. If we ask the DOS to write to the highest number of RECORDs which we might need, the DOS will create that RECORD first, and then go on to create the RECORDs below it down to RECORD 1. But we have to tell it to do this.

With BASIC 7 it is easy; DOS works out the correct pointers for each RECORD: all we need is to tell it the RECORD number of the LAST RECORD required and the DOS will then create all the RECORDs up to it. This can take some time because even the 1571 writes only about three RECORDs per second.

For five thousand RECORDs there woulld be a long delay while these were being created which is very boring. You might consider creating the RECORDs in blocks of fifty, creating the next batch of fifty when the RECORD number reaches the end of the created file.

The statement for all read and write operations is RECORD . The number after the symbol is that of the file previously opened, in our case five. If the record to be accessed is a variable, then the variable must be enclosed in parenthesis. The last number given is the byte number of the start of the read or write, and here this is 1.

Now we can program the create file subroutine.

```
2400 print "Creating File";name$
2410 print "Records Set at";avail
2420 dopen # 5,(name$),1(1rec):gosub
3610
2430 record # 5,(avail):gosub3610
2440 record # 5,(avail):gosub3610
2450 print # 5,chr$(255):gosub3610
2460 dclose:gosub3610:return
```

Notice we make the RECORD statement twice. This is recommended by the 1571 disk-drive manual as a safety measure. The DOPEN file statement has the name of the file, NAME$, enclosed in parenthesis. Now look at what the poor C64 owner has to do!

File Create Routine – BASIC 2

Now, C64, Owners, we have to sort you out. The same basic principles apply, but you have to do more programming in order to achieve the same results. We have already looked at the OPEN statement for the file; now we have to write another routine so that the RECORD pointers, (not to be confused with field pointers) can be calculated before a read or write operation is commenced.

We have first to calcuate the Hi and Lo bytes of the RECORD before we begin. The RECORD statement is denied to us on the 64 or the 128 in 64 Mode, but we simply program a separate sub-routine to take the place of the RECORD statement.

We write this sub-routine so that it can be referred to from any part of the program. We shall need the routine for every read and write operation. We can slot it near the disk error check sub-routine:

```
4112 rem **** 64 Record Pointer
Routine
4114 hi=int(rp/256):rem**** rp is
desired record number
4116 lo=rp-256*hi: rem** hi and lo
are the high and low bytes of the
RECORD
4118 return
```

Now, during the program, provided that the variable RP contains the desired RECORD to access, a GOSUB to this routine will return the proper pointers to that RECORD within the file. Now we can continue with the file create routine. First we put a message on the screen to explain what is happening:

```
2400 print "Creating File";name$
2410 print "Records Set at";avail
```

Then we open the error Channel,

```
2415 open15,8,15
```

And then we get to the nitty-gritty. Notice that the OPEN statement contains the string NAME$. Pay particular attention to the odd format of the statement. One missed comma within the quote marks will give you a syntax error.

```
2420 open5,8,5,"0:"+name$+",1,
"+chr$(1rec):gosub3610
```

We use the record pointers routine to find the hi and lo bytes of the RECORD by declaring the variable rn as equal to avail.

```
2425 rp=avail:gosub4114:rem***get
Record pointers
```

And then we position the pointers before we do anything. You notice that we use the Command Channel 15 to position the pointer. The CHR$(96+5) is a constant used to keep the file compatible with the way BASIC 7 files

work. Always use the number 96, then add the File number (not the command file no 15) to it.

```
2430 print # 15,"p"+chr$(96+5)+chr
$(lo)+chr$(hi):gosub3610
```

We repeat the statement for safety. Notice this time I have simply added the file number 5 to 96 to provide the channel number.

```
2440 print # 15,"p"+chr$(101)+chr$
(lo)+chr$(hi):gosub3610
```

Then having positioned the pointers to the correct highest RECORD number, we write the special null character to the RECORD. Notice that the PRINT statement uses the file number and not the command channel to write to the RECORD.

```
2450 print # 5,chr$(255):gosub3610
2455 Close5:gosub3610
2460 Close 15:return
```

Here we have closed the file and checked the disk for errors BEFORE closing the command channel 15. It might be easier to simply open the command channel right at the beginning of your program and leave it open throughout, only closing it when all accesses have finished, but here I close it to make the point.

Although there is no sign of it from the program, the DOS of your disk drive will take over now, and create all the RECORDs in the file ready for future use. For this reason you might consider setting the variable AVAIL to, say fifty RECORDs to begin with, and then creating the RECORDs in batches of fifty, otherwise you may have quite a wait until 4000 RECORDs have been created.

They are all the routines you need to create a relative file ready for use. Remember, you must specify the length of the RECORD LREC. You should have already decided on the length of each of the FIELDs and assigned these lengths to the FIELD array, and declared the number of FIELDs to the variable C.

If you have done that, the FIELD Pointer sub-routine will work out everything else the program needs. String or numeric variables may be used with either BASIC 7 or 2, but those using the C64 MUST be very careful not to omit the commas inside the quote marks.

In order to use a relative file, it is important to get the routines in the right order. Use them as follows:

Get the name of the File into NAME$.

INPUT the FIELD lengths into the Array FIELD(), with C as the number of FIELDS you require.

GOSUB to the field pointer routine. The length of the RECORD will be returned as LREC.

Use the AVAIL variable to calculate the permitted maximum number of RECORDs in the file.

GOSUB to the file creation sub-routine. C64 owners will need to GOSUB to the special RECORD pointers sub-routine for the relevant bytes required. DO NOT forget the Disk-Error check for EVERY disk access.

The file will then be set up ready for use.

In the next part of the series. I will be detailing routines for collecting the different FIELDs into a single STRING for writing and then reading them from the RECORDs. I shall explain the use of the FIELD separators a little more fully later on so that you may decide for yourself how to use them.

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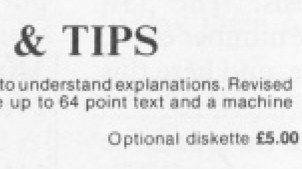
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Input Clean-Up

Using the INPUT command can be a very messy business. Here's one way around the problem.
By Kevin Blight

By Kevin Blight

The only problem with the built-in INPUT command on the Commodore 128 is that the user is allowed to type in any combination of characters available from the keyboard. This can cause problems if, for instance, a comma or even worse, inverted commas are entered. In addition, it is only possible to include text in front of the question mark and cursor. A statement which results in a screen printout such as:

NAME?   AGE

It would be useful for a database type of program. Two inputs on one line would result in the word AGE being added to the string entered at the name.

Input Clean-up circumvents these problems and more:

1. Maximum input length is set by the user.
2. The actual input length is stored in a zero page location.
3. Upper/lower case switching is disabled.
4. Commas and inverted commas are ignored.
5. Only alphanumerical characters and punctuation marks are accepted.
6. A delete function is available (using either cursor left or the DEL key).
7. Cursor right inserts spaces.
8. The user will exit from the routine if cursor up, cursor down or the RETURN key is pressed. In any of these cases, a flag is set to indicate which one it was.

Once installed, the new routine is selected by SYS 4864, m. The value of m represents the maximum length of the input and can have any value from 1 to 80 and any value outside this range will cause the routine to abort automatically.

A special cursor is printed during input (similar to an underline cursor) and, if this reaches the maximum length which was set when the program was SYS called, the routine will hand back to Basic program control.

As stated earlier, exit from the routine can be achieved with cursor up and down or RETURN keys. The method of exit is then recorded in location 250:

0 Cursor down pressed
xxx
0 Either maximum length was reached or RETURN was pressed.
1. Cursor down pressed.
2. Cursor up pressed.

With the correct routines, these values can be used to indicate if the user wishes to go forward or backwards through a list of entries. The length of the input statement is stored in location 251 in Zero Page.

Apart from the Basic loader and disassembly, there is also an example listing. This takes the input and stores it as A$, while its length is stored in A%.

With very little work, Input Clean-up could also be made to run on the C64. Only two of the memory locations specific JMP commands within the routine, the rest are conditional branches and $FFD2 or $FFE4 are both part of a jump table common to both machines.

Change the Basic loader lines as follows:

```
140 DATE 49152,49630
180 DATA FF,A9,20,A2,00,9D,CC,
C0,0493
280 DATA FB,9D,CB,C0,E4,FA,F0,
10,0601
410 DATA FB,4C,2B,C0,54,48,49,53,
036A
```

tines, these
dicate if the
orward or
t of entries.
statement is
Zero Page.
loader and
an example
it and stores
is stored in

nput Clean-
run on the
e memory
commands
e rest are
$FFD2 or
jump table
s.
der lines as

2,00,9D,CC,

),E4,FA,F0,

54,48,49,53,

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Reveal Your Characters

Sprites don't have to be visible to be effective. Here is one way to get them to work for you.

By Simon Clarke

*H*igh resolution sprites are usually visible, coloured characters which show up well against the background colour. In other words the colour of the 'on' Pixel differs from the background colours. In some of my commercial games I have found an interesting use for invisible sprites – solid sprites set to the current background colour – to smoothly reveal text onto the display screen.

An unexpanded sprite, Sprite 0, is created as a solid block of colour measuring 8x8 pixels; the size of one character. The colour of this sprite is then set to equal the background colour and is placed on the screen where the first character of the text will be placed.

As the sprite sweeps across the screen pixel by pixel, the first character is revealed. Once the sprite has moved far enough to reveal all of the character, the next character is poked into position and revealed.

This process repeats until all of the characters are displayed giving the impression that they have been printed pixel column by pixel column. This technique opens up several possibilities for the programmer and a few suggestions follow.

Larger, expanded sprites could reveal larger blocks of text or large user-defined characters by switching on all of the sprite pixels.

Two sprites could reveal text from either end of a line but try to arrange that they overlap at the middle of the text, line over a space or the illusion will be spoiled.

Complex reveal techniques can be developed by using specially shaped sprite. An example of this would be to create the top corner of the sprite in Figure 1.

```
.......XXXXXXXX
......XXXXXXXXX
.....XXXXXXXXXX
....XXXXXXXXXXX
...XXXXXXXXXXXX
..XXXXXXXXXXXXX
.XXXXXXXXXXXXXX
XXXXXXXXXXXXXXX
```

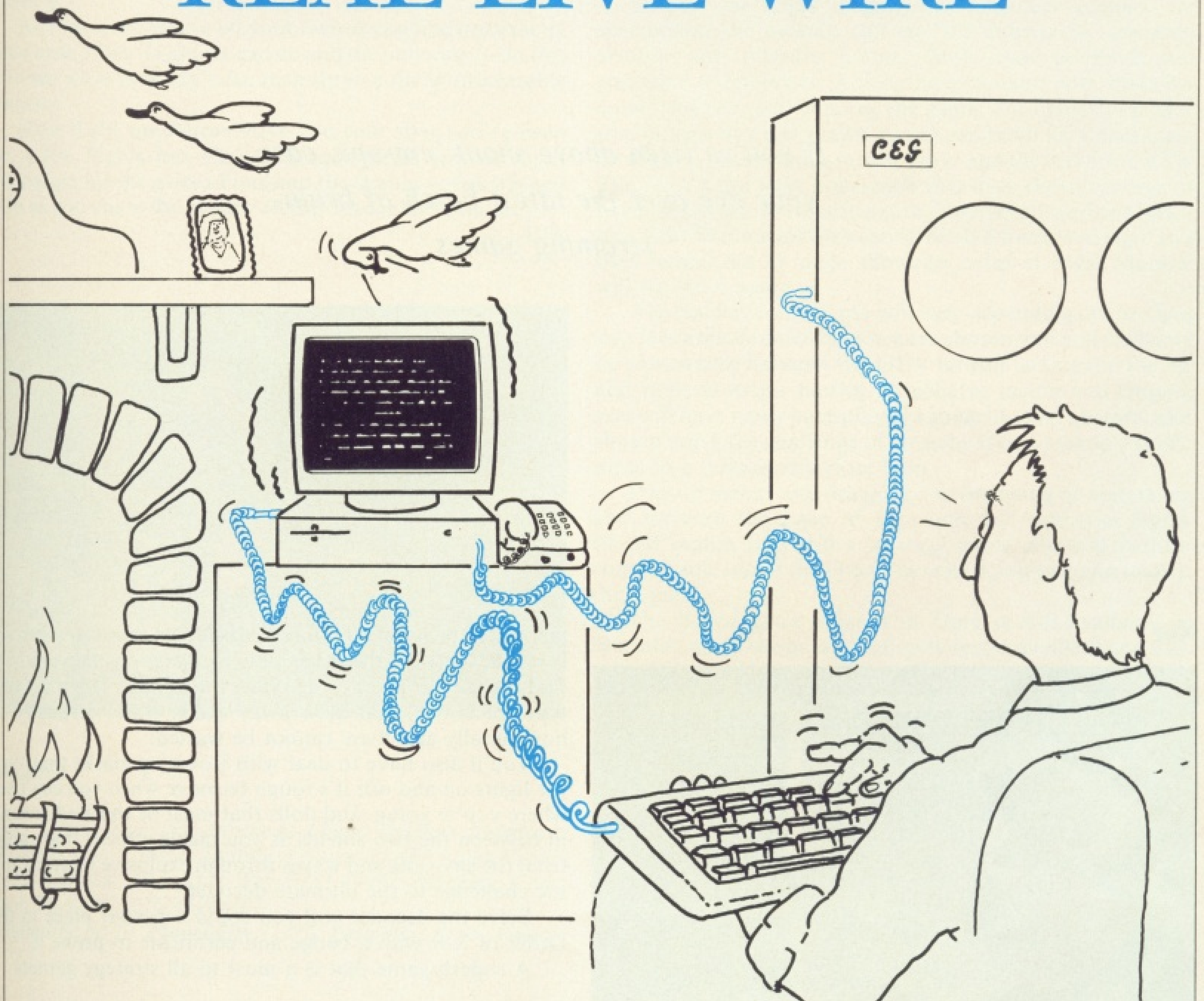
Figure 1

Each '.' is an off pixel and the 'X' represents a switched on pixel. The effect created is that each pixel row is revealed pixel by pixel. As the second row of the first character is revealed the next character starts to appear.

By poking values to the sprite area according to a predetermined pattern, the astute programmer could make letters fizzle into view in an apparently random hi-res pattern. Beam them up, Scotty!

Think about the process for a while and I'm sure that you could adapt my program to all sorts of purposes. Remember there are no restrictions to this process apart from the number of sprites display rules. Use several sprites or even a high resolution screen and for amazingly colourful and impressive results.

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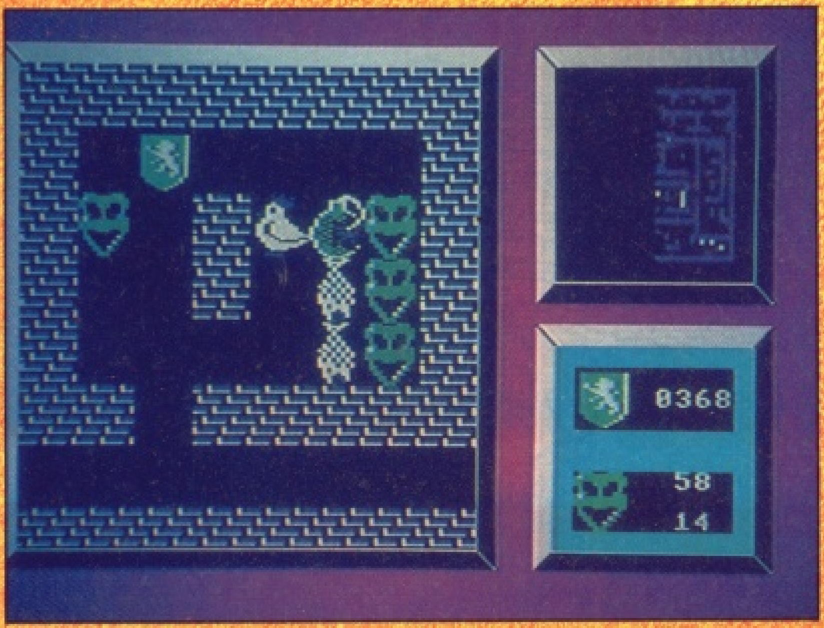
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I.Q.

If you've risen above shoot 'em-ups, cast your eye over the latest batch of brain-straining games

Xor



Xor is a manical maze game that will mangle your mind and you'll love every minute of it!

You must collect masks from fifteen mazes by running one of your two shields over them and the only things that can possibly get in your way are chickens that always move left and fish that always drop down. It couldn't be simpler. Well, it could be a lot easier particularly since one wrong move could cost you the entire game.

It's surprising how easy it is to get trapped with nowhere to go or crushed by a chicken or a plummeting fish.

Avoiding such disasters must be your first priority and finding a map the second. This must be collected and comes in four segments and it's almost suicidal to enter a quandrant if you haven't got the map. Only by using the map can you find the correct place to detonate the bombs. There are two types of bombs that blow away walls, either vertically or horizontally and these cannot be wasted.

You'll also have to deal with frowning masks that turn the lights on and off; it's tough to move when you can't see where you're going, and dolls that must be shuffled around in between the two shields as you tackle screens that range from the easydots and waves through explosive mixture and the challenge to the ultimate decoder.

Solve the decoder and you could win your place in the Order of Xor with a badge and certificate to prove it.

A superb game that is a must to all strategy gamers.

T.H.

Touchline:

Title: *Xor.* ***Supplier:*** *Logotron Ltd., Dales Brewery, Gwydir St., Cambridge CB1 2LF.* ***Tel:*** *0223 323656.* ***Machine:*** *C64.* ***Price:*** *£9.95 (C) £12.95 (Disk).*
Originality: *9/10.* ***Playability:*** *9/10.* ***Graphics:*** *4/10.* ***Value:*** *9/10.*

Chuck Yeager's Advanced Flight Trainer

Chuck Yeager, the first man to break the sound barrier, invites you to sit in the test pilot's seat as you push 14 different aircraft to their limits and then survive!

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(quickly) the importance of not having your landing gear ripped off and why it's not safe to stall a plane. The instructor uses a cursor and messages that are easily followed by joystick movements so that you're soon ready to join those magnificent men in those flying machines when you've perfected aerobatics such as the slow roll, split S and cuban 8.

As a test pilot you're on your own as you find out exactly what each of the 14 planes can do and the only way to do this is to see what they can't do, then survive the unpredictable outcome.

Most flight simulators leave you cold after you've been for a few flights but Chuck Yeager offers you 14 flight simulators for the price of one and the chance to risk life and limb as you chase the master on the dead man's slalom.

T.H.



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Title: *Chuck Yeager's Advanced Flight Trainer.* ***Supplier:*** *Electronic Arts, Langley Business Centre, 11-49 Station Road, Langley, Berks., SL3 8YN.* ***Tel:*** *0753 49442.* ***Machine:*** *C64.* ***Price:*** *£9.95 (C) £16.95 (Disk)*
Originality: *6/10.* ***Playability:*** *7/10.* ***Graphics:*** *6/10.* ***Value:*** *8/10.*

Ogre

Can you stop the Ogre in his tracks? That's the challenge laid down by Origins in the computer version of the classic board game. The Ogre is a cybernetic supertank that rules the battlefields of the 21st Century. You command a defensive force of infantry, tanks and guns who must defend the unarmed command post and stop the Ogre!

Ogre the game is supplied on disk in a standard (impressive) Origins/Microprose box with a manual, tactics book and command card (printed yellow on grey yuch!!) and an anti-radiation badge which is essential on a battlefield where nuclear shells fall like confetti.

Ogre the cybertank is a massive living machine that actually enjoys crushing infantry under it's tracks or frying them with it's anti-personnel mines. There are two types of Ogre – Mark III and Mark V. Mark III is formidable with an aresenal of two missiles, a main battery and four secondary batteries that can wreck most defences. Mark V is even worse with six missiles, two main batteries and six secondary guns! All of which can fire every turn.

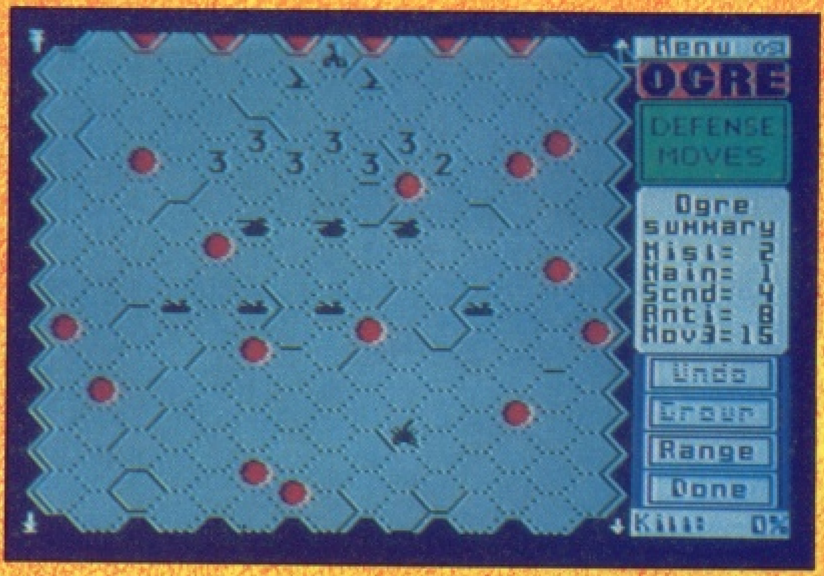
Before the Ogre begins his relentless journey of destruction the defence can *buy* it's defence by spending armour and infantry points. With these points it can construct a defence to protect the command post. Lose the command post and you lose the game. The defensive player (the human in a one player game) can build his forces from howitzers, heavy tanks, missile tanks and the versitile GEVs. The GEV's are light hovercraft that have the advantage of being able to move twice in a turn, once before and once after they fire! This means they can strike at a weakened Ogre and then retreat out of range. However, a full strength Mark V will rip them apart.

The tractics you will use will vary depending on the Ogre you face and the defences you have chosen, but will probably lie somewhere between the GEV hit run tactics and the hit and hope howitzer battles. Whichever tactics you employ you will have never have played a game like Ogre before, and should relish the challenge of an army trying to stop a single piece in a remarkably close fight.

Pop-up menus and dragging and dropping of objects try and increase the pace of the ame bu potential Ogres should realise it is still a strategy game and will require considerable use of the little grey cells if you're going to stop the Ogre.

The board game version of Ogre is still available in specialist game shops (and is highly recommended) and was followed by a sequel called GEV and several articles in hobby magazines detailing the Mark VI Ogre as well as aircraft and naval actions in the Ogre world. Perhaps there's a sequel waiting in the wings. If there is I'll be ready, although
I doubt the infantry that were crushed in the last game will be as keen.

T.H.



Touchline:

Title: *Ogre.* ***Supplier:*** *Origins/Microprose, 2 Market place, Tetbury, Glos., GL8 8DA.* ***Tel:*** *0666 54326.* ***Machine:*** *C64.* ***Price:*** *£19.95 disk only.*
Originality: *9/10.* ***Playability:*** *8/10.* ***Graphics:*** *3/10.* ***Value:*** *8/10.*



TETRIS

*H*ave you heard the old saying that the simple games are the best? Here's another one to prove it. It will also give you sleepless nights and no doubt do irreperable damage to your brain. Games like this should carry a government health warning!

The screen display shows a plain rectangle and some "artistic" graphics that try to jazz up the screen however, all the action takes place in the rectangle. One after the other shapes tumble down from the top of the screen and rest when they either reach the bottom or fall on top of another piece. Using the joystick you can move the piece left and right as it falls and rotate it through 90, 180, 270 and 360 degrees by successive presses of the fire button.

The object of the game is to arrange the pieces so that they fit together to form complete lines across the rectangle (this means leaving no gaps). If you manage this your score goes up as the increasing pile of pieces moves down but if you allow the pieces to reach the top the game ends, probably with you hurling the joystick across the room in frustration.

The pieces are simple enough and consist of straight lines, L shapes, boxes, shapes and T shapes which fit together nicely if you get them in the right order but the game always seems to throw you exactly the wrong piece at the wrong time! This leaves you with some difficult juggling to do if you're going to stay in the game. That's all there is to it except to warn you not to go near it as you cannot just play it once. I played it solid for two days and with deadlines to meet that proved expensive. You have been warned!

Touchline:
Title: *Tetris.* ***Supplier:*** *Mirrorsoft, Athene House, 66-73 Shoe Lane, London EC4P 4AB.* ***Tel:*** *01-377 4645.* ***Machine:*** *C64.* ***Price:*** *£8.99 (Ca) £12.99 (Disk).*
Originality: *8/10.* ***Playability:*** *9/10.* ***Graphics:*** *5/10.* ***Value:*** *9/10.*

PHANTASIE III

This is (not surprisingly) the third in the SSI Phantasie series and tells the tales of your brave party of adventuring humans, elves, dwarves, gnomes and halflings joined together in a common aim to stop the Dark Lord Nikademus from carrying out his plans to take over the world!

As you begin your quest your thoughts are far from the nobble struggles ahead, instead you must concentrate on just staying alive as the massive Phantasie III world of wilderness, towns and dungeons is packed full of monsters that would love to add you to their menus and you shouldn't be surprised if your entire party is wiped out by the first encounter! In fact, this happens with alarming regularity so you'll get plenty of practice at creating characters and assembling parties. I found the best combination of characters was to have three fighters to beat up anything that moves, a thief to fire a bow, pick locks and disarm traps and a wizard and priest to cast spells and heal the many wounded.

Phantasie I and II players will be familiar with the basic game system in which you travel the land in search of clues, treasure and magic items and weapons that will help you in your quest but will appreciate the improvements made in the games graphics and gameplay. Now the bleak landscape is transformed into pseudo 3D. It still limps across the screen but at least now it looks better. As before you encounter foul creatures that roam the land but now the action is quicker and the cut and thrust of combat is accompanied by (limited) animation. Combat can be complicated as each character must decide whether they are going to stride manfully (suicidally) to the front of the party, stay in the middle or cower at the back, then whether they are going to thrust, attack, slash, parry, cast a spell or fire a bow and arrow. Then the action continues with the monsters battling you to the death until one of you drops. If you win the contest you may pick up some gold, some experience points and maybe even a useful magic potion, weapon or armour. If you all die then you're transported to the astral plane where a demon decides to destroy you or return you as one of the legion of the undead. You can still fight as normal but you need 15679600 experience points, instead of the usual 4-600, to reach the next level!



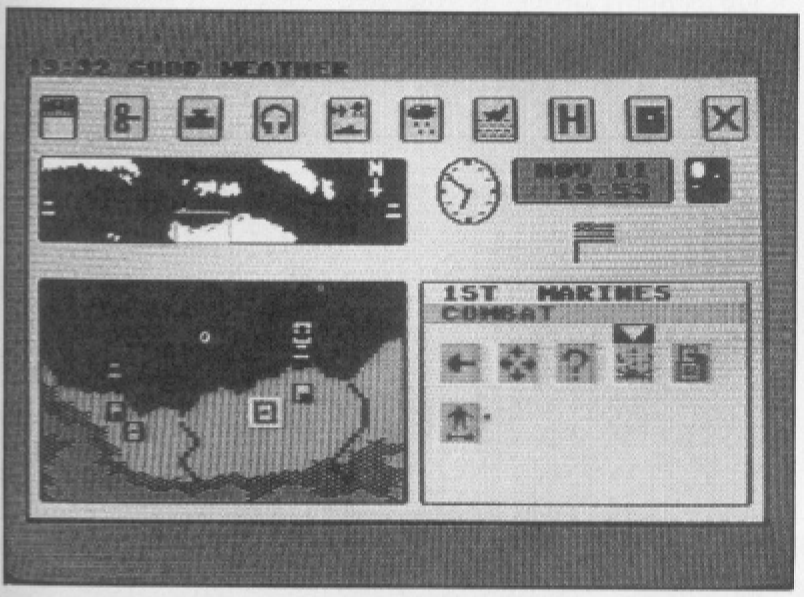
The parties accumulated experience is divided between the survivors when they enter a town and could mean an increase in level if they visited a guild. This level increase not only means more hit points to keep you alive longer but also three chances to improve your characters abilities such as their chance to hit, their ability to parry attacks and their skills at picking locks or disarming traps.

Eventually, you will build up a party of heavyweight characters that can survive a surprise attack from fire breathing dragons and be ready to track down and take on the Dark Lord himself. The best of the Phantasie games.

Touchline:
Title: *Phantasie III.* ***Supplier:*** *SSI (US Gold), Units 2/3 Holford Way, Holford, Birmingham, B6 7AX.* ***Tel:*** *021 356 3388.* ***Machine:*** *C64.* ***Price:*** *£19.99 (Disk only).*
Originality: *7/10.* ***Playability:*** *8/10.* ***Graphics:*** *7/10.* ***Value:*** *8/10.*

GUADALCANAL

One of the bloodiest campaigns in the Pacific Theatre of World War II, the struggle for the island of Guadalcanal lasted five months starting in August 1942. Not only did acion take place on the island itself, but also the surrounding seas as the American and Japanese navies struggled to maintain supplies to their own forces while simultaneously trying to destroy the enemy fleets.



The Activision wargame Guadalcanal gives you three main scenarios to attempt. A short three day campaign allows you to gain battle experience using the American forces before progessing onto the full campaign where you can play either side.

The game tries to encompass all the major elements of the campaign so the player will have to come to terms with fighting on land, at sea and in the air. Maintaining supplies to your troops, sending out scouts and seaplanes in order to discover the location of enemy forces and attempting to crack the enemy's codes while protection your own are other vital skills.

Control of the game is via a series of ten main icons with many of these leading to a further selection of choices. There are two maps on screen, a small scale one of the area surrounding the island, a large scale scrolling map of the island itself. Units are depicted as tin flashing dots or single characters on the respective maps and I found that these were difficult to read at times. This was especially true when it came to moving land based troops which involves moving a cursor on the large map and watching the course plotted appear on the small one.

My impression when playing Guadalcanal is that the authors tried to include too much with the result that playability has been sacrificed for authenticity. This is all the more so when coupled with a tricky control system and a poorly designed instruction manual. There is nothing wrong with complexity in a wargame and experienced wargamers will no doubt delight in getting to grips with this game. But for anyone wanting to try wargames for the first time, I would suggest that they look elsewhere. **G.R.H.**

Touchline:
Title: *Guadalcanal.* ***Supplier:*** *Activision, 23 Pond Street, Hampstead, London NW3 2PN.* ***Tel:*** *01.431 1101.* ***Machine:*** *C64.* ***Price:*** *£9.99 (C) £14.99.(Disk).*

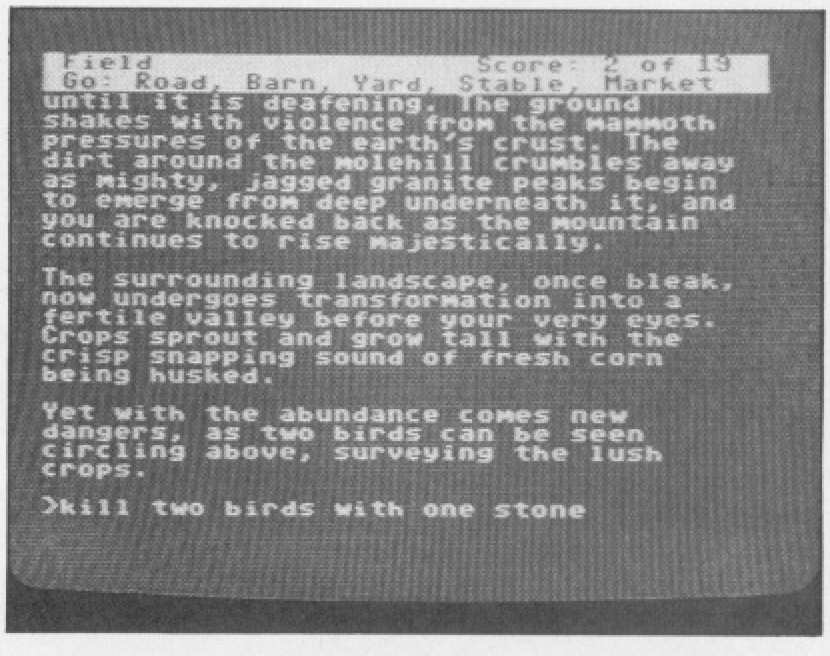
Originality: *8/10.* ***Graphics:*** *5/10.* ***Playability:*** *3/10.* ***Value:*** *3/10 for beginners.* ***Value:*** *7/10 otherwise.*

NORD AND BERT

This is a departure from the normal Infocom style of games in so much as it is eight short stories rather than one long one. The idea is superb, the execution somewhat less so.

The stories are set around the town of Punster, a somewhat mixed up place desperately in need of sorting out. Each of the eight stories features a different type of word play — cliches, spoonerisms, proverbs, etc. For example, down on the farm, there are a number of things that need putting right. A field contains a molehill. How do you get rid of it? Simple, you make a moutain out of a molehill! Two birds are molesting your corn so you need to find a stone in order to kill them. And so on.

If this type of wordplay appeals to you, then all well and good but be warned, you will need to be very well versed in American idiom. The main problem with this game is that



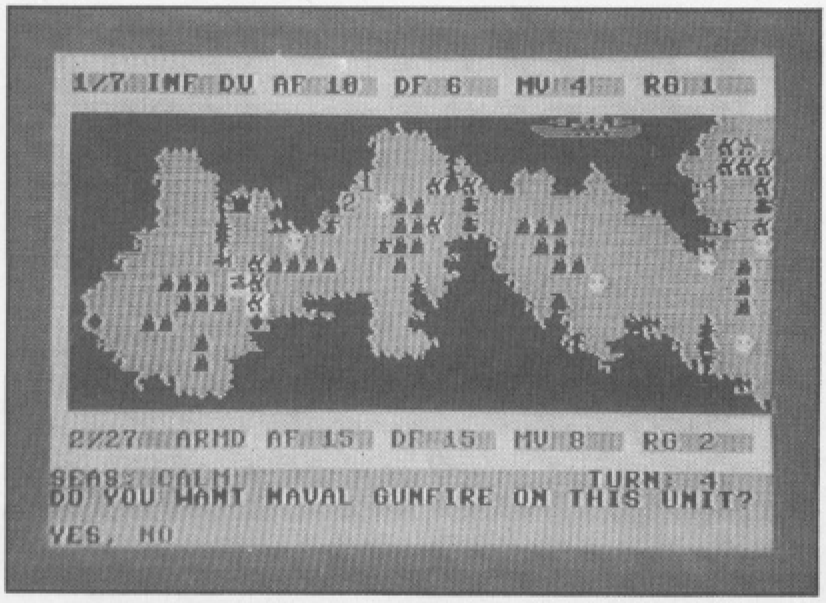
there are too many answers that the average Brit will not know and so will have to resort to looking up the solutions (a series of solutions are included on the disk). I would not have minded the odd one but I found that I was having to cheat too many times and in my opinion, that does not represent good value for money especially at just under twenty-five pounds. G.R.H.

Touchline:

Title: *Nord and Bert Couldn't Make Head or Tail of it.* ***Supplier:*** *Activision/Infocom, 23 Pond Street, Hampstead, London NW3 2PN.* ***Tel:*** *01-431 1101.* ***Machine:*** *C64 Disk only.* ***Price:*** *£24.95.*

Originality: *10/10.* ***Graphics:*** *n/a.* ***Playability:*** *3/10.* ***Value:*** *3/10.*

OKINAWA



In Iwo Jima, also a PSS wargame, your task was to command US forces in their mission to take the vital Japanese island of Iwo Jima. Now in this latest of the Classic conflicts series you can command British and US forces as they storm the equally important island of Okinawa.

If you manage to take the island, you the Allies will be able to build an airbase from which they can launch an attack on Japan. However, this isn't going to be easy as there are thousands of Japanese troops, tanks and gun emplacements as well as submarines and kamakazi pilots to take out your naval support.

The game is played in turns in which you can either move or fire some or all of your units. If a unit moves it can't fire so you have to plan your advance well to direct your firepower in the right paces at the right time. As the attack begins there are only Japanese forces on the island (and these are hidden) so you must land your troops at any of the seven selected sights, form a beach head and then drive on destroying all in your path.

As the battle rages you'll discover the relative strengths and abilities of infantry, tanks and artillery as well as when and where to use your naval gun support.

Historically, Okinawa was a dress rehearsal for the invasion of Japan and the casulties you'll sustain will show you why the Allies altered their troop estimates from one to five million men and finally opted for the bomb. As a wargame it plays well and the narrow craggy coast poses any joystick Generals with a difficult task. T.H.

Touchline:

Title: *Okinawa.* ***Supplier:*** *PSS, 452 Stoney Stanton Rd., Coventry, CV6 5DG.* ***Tel:*** *0203 667556.* ***Machine:*** *C64.* ***Price:*** *£4.99 (Ca) £9.99 (Disk).*

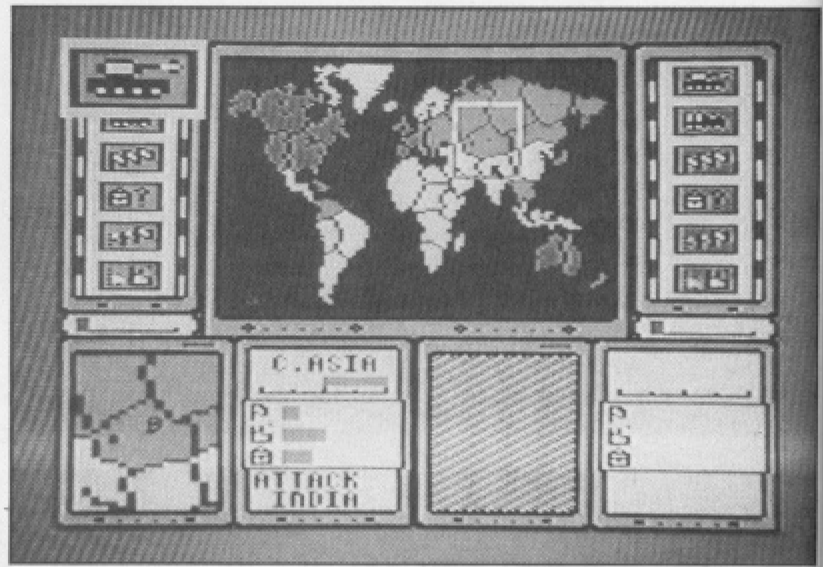
Originality: *4/10.* ***Playability:*** *7/10.* ***Graphics:*** *5/10.* ***Value:*** *7/10.*

POWER STRUGGLE

Are you a power mad meglomaniac? If not, here's your chance to see whether you could rule the world as you take control of the East or the West in PSS's Power Struggle.

When the game is loaded the program assigns either random countries to each power or the standard setup.

Power Struggle is played in timed turns in which you can issue as many orders as you have time for. If you run out of time you'll have to wait until the next turn by which time you may have lost control of the country.



To issue your orders you simply move a cursor across the map and highlight a country by pressing the fire button. This produces a display that shows the current strengths of that countries army, industry and political power and a second press will activate the command icons through which you can raise more troops, increase industry (industry can then produce armies in a later turn), attack an adjacent country, enforce (support) another country, supply (send industry) an adjacent country or politically infiltrate another state.

At the end of each turn the computer resolves any combat and the political colour of the world. If any states support you fully then you'll gain total control of them. Control the world and you'll win the game.

To succeed you have to perfect a difficult balancing act between military attacks and their heavy costs in troops and the more insidious political infiltration.

This isn't quite Colonial Conquest but as a low level power game you won't struggle to play it. T.H.

Touchline:

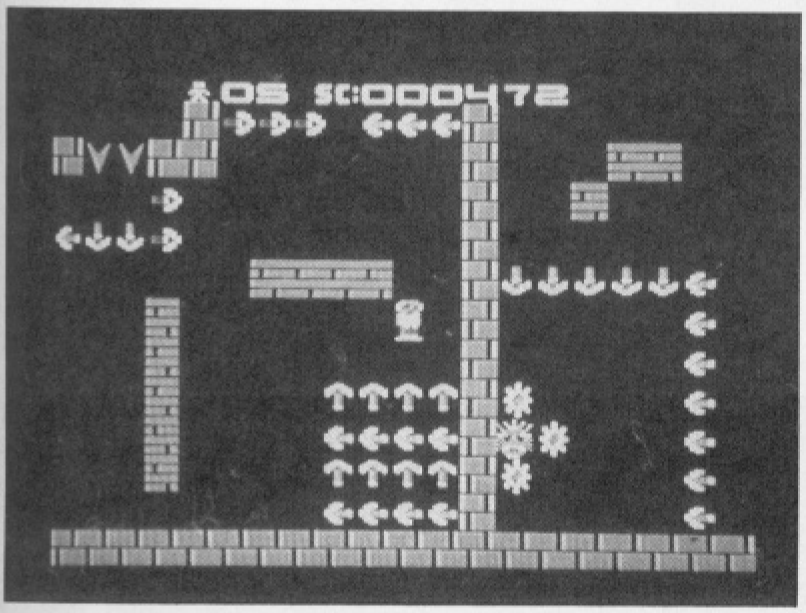
Title: *Power Struggle.* ***Supplier:*** *PSS, 452 Stoney Stanton Rd., Coventry, CV6 5DG.* ***Tel:*** *0203 667556.* ***Machine:*** *C64.* ***Price:*** *£4.99 (Ca) £9.99 (Disk).*

Originality: *6/10.* ***Playability:*** *7/10.* ***Graphics:*** *5/10.* ***Value:*** *6/10.*

SARACEN

Datasoft's Saracen that's released through the Americana label by new publishers Mastertronic is one of those really addictive but irritating games that you just can't stop playing. The game casts you as Ilan the Crusader who must battle through 100 mazes to destroy 100 Saracen chiefs. In your way are walls that you can destroy with your arrows, Saracen soldiers that patrol the mazes and a selection of booby traps to kill the unwary.

To kill the Saracen Chief and reach the next level you must find and place a grenade (???) next to him and then detonate it with an arrow. However, to get the grenade and reach the Chief you will have to get past patrolling soldiers, blast your way through walls, find keys and then the locks they open, avoid killer traps and one way doors, exploding bombs and remove magic doors.



To help you survive you can pick up single shot, single direction arrows for your bow so you have to make sure you're holding the right arrow at the right time or you'll lose one of your lives.

Luckily, the game is friendly and allows you to continue your next game from the last level you reached, otherwise the game would be impossible.

T.H.

Touchline:
Title: *Saracen.* ***Suppliers:*** *Americana (Mastertronic), 8-10 Paul Street, London EC2.* ***Tel:*** *01-377 6880.*
Machine: *C64.* ***Price:*** *£2.99.*
Originality: *6/10.* ***Playability:*** *7/10.* ***Graphics:*** *4/10.* ***Value:*** *7/10.*

WIZARD'S CROWN

Wizard's Crown combines the role playing action of other SSI games with strategic combat in which you can play every move and blow as you battle your way through a perilous quest to retrieve the priceless crown of the Emperor. The Crown has been stolen by the evil Wizard Tarmon and you and your brave party of adventurers must get it back.

The game begins in a town which has streets full of thugs and thieves to rob you but also provides some easy opponents for you to kill and build up your experience. Also in the town you'll find temples to pray in, Inns to rest in and shops to improve your weaponry.

Your party can have up to eight humans in it (no mixed races in this game) that can follow the discipline of Fighter, Ranger, Thief, Priest or Wizard. Each character class has their own stengths and abilities. For example, Wizards can wield powerful magic whereas Priests can pray to heal wounds.

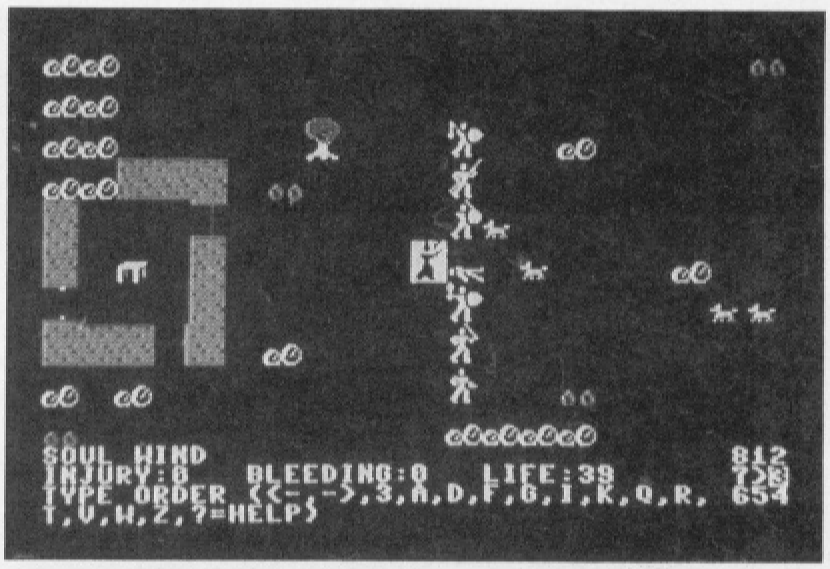
As you build up experience you can cash it in to improve each character's abilities such as skill in a specific weapon or in picking locks, turning the undead, haggle the best price and treat wounds with first aid.

When your party encounters some monsters you can decide whether to let the computer decide the outcome in quick combat or if you don't like this "hidden hand of death" style of play you can act out every cut, thrust and parry of the full battle. In full battle mode you must plan your parties formation to meet the onslaught and then wield swords and spells together to win the day. After the battle you may find items of use that you can pick up and get your priests to patch up any walking wounded.

Eventually, your party will grow in strength and wealth and soon will be ready to leave the relative safety of the town and explore the ruins where goblins lurk in alarming numbers and then on into your quest.

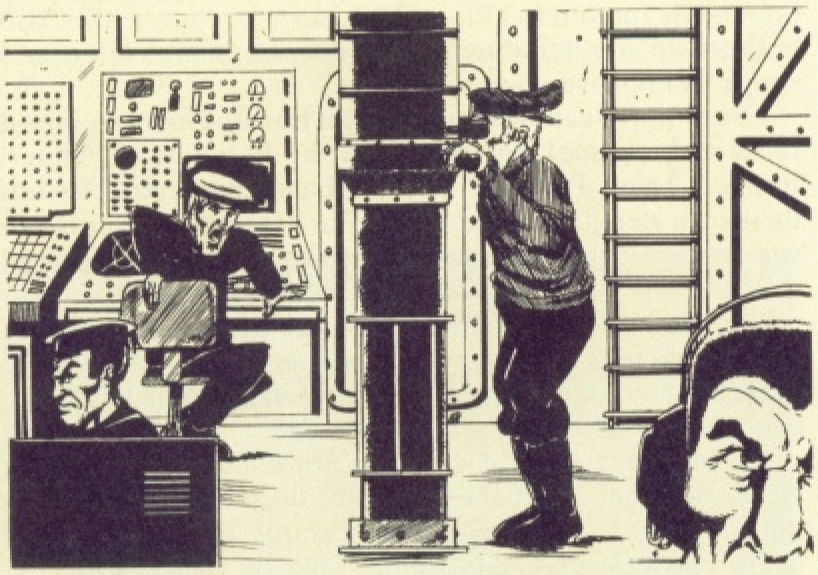
Wizard's Crown is an excellent mix of adventuring and combat and with a playing time of over 50 hours you won't get bored!

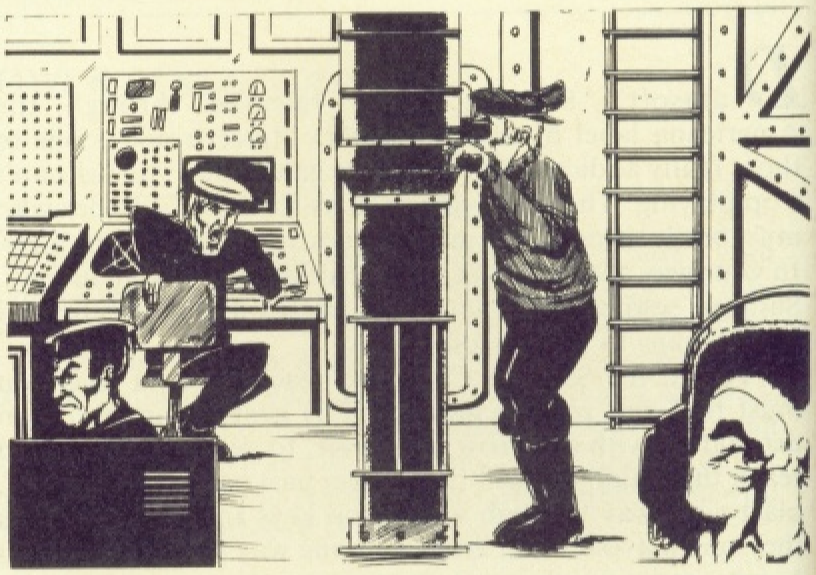
T.H.



Touchline:
Title: *Wizard's Crown.* ***Supplier:*** *SS1 (ŪS Gold), 2/3 Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021-356 3388.* ***Machine:*** *C64.* ***Price:*** *£19.95 – disk only.* ***Originality:*** *7/10.* ***Playability:*** *7/10.* ***Graphics:*** *5/10.* ***Value:*** *8/10.*

Win a Copy of Jane's Fighting Ships





Win this month's competition and you could be taking to the high seas with your own copy of The Hunt For Red October

The Hunt For Red October, from Grand Slam Entertainments (was Argus Press Software) has already received some excellent reviews in the computer press.

Your Commodore is pleased to team up with Grand Slam Entertainments for this month's competition and this is a chance to win one of ten copies of the Hunt For Red October. Furthermore, the first winner out of the hat on the closing date will win their own copy of Jane's Fighting Ships. A rather expensive addition to your book collection.

For those of you not familiar with the scenario for Hunt For Red October, it is based on the book by Tom Clancy and you play the part of the captain of Russia's most advanced submarine, Red October. You are heading for the US of A – to defect. The Russians are of course out to stop you.

How to Enter

Study the two cartoons on this page, there are a number of differences between them. Once you have decided how many differences there are complete the entry coupon and send it to the editorial address (see the coupon). Write the number of differences that you have found on the back of the envelope. If you don't your entry will not be accepted.

The Rules

Entries will not be accepted from employees of Argus Specialist Publications and Grand Slam Entertainments. This restriction also applies to employees' families and agents of the companies.

The How to Enter section forms part of the rules. The Editor's decision is final and no correspondence will be entered into.

Red October Entry Coupon

Name...

Address ....

....Postcode ....

Number of differences found ....

If I win I would like the format of my copy of Hunt for Red October to be:

Commodore 64 tape ......

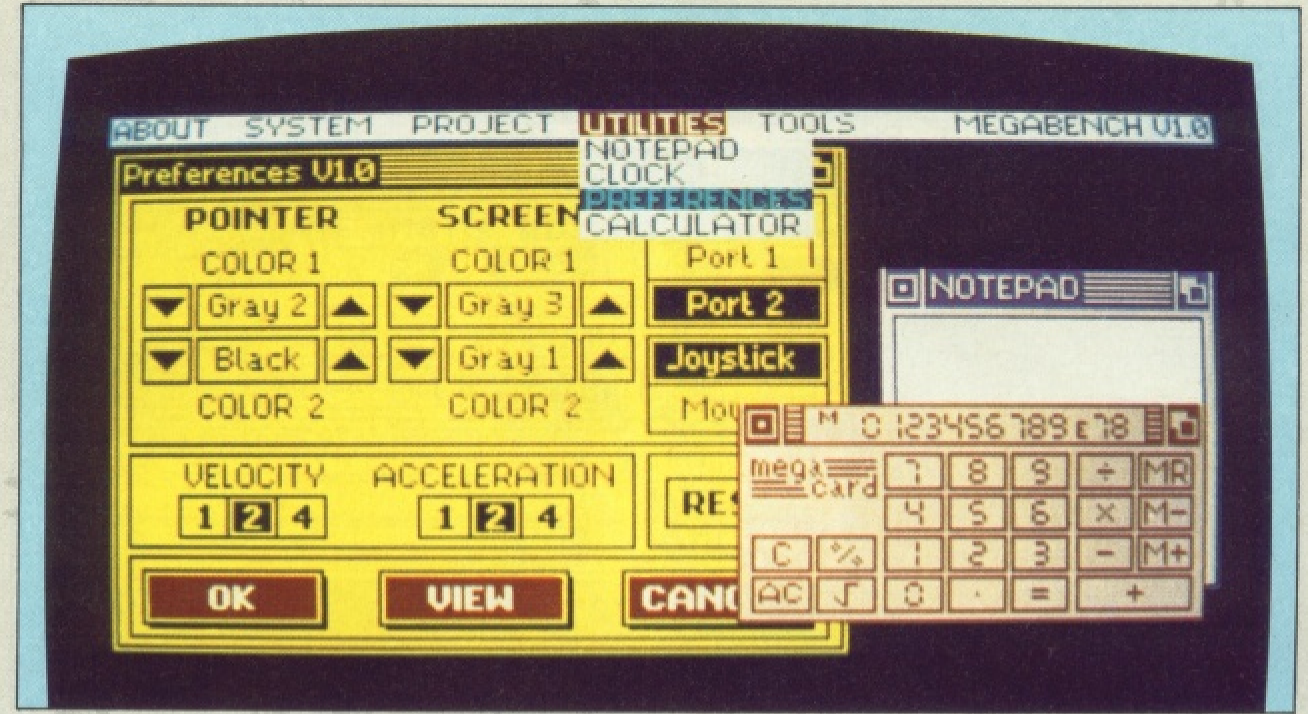
Commodore 64 disk ......

Amiga disk....................

(please tick as appropriate)

Post to: Your Commodore,
Red October Competition,
1 Golden Square,
London W1R 3AB.

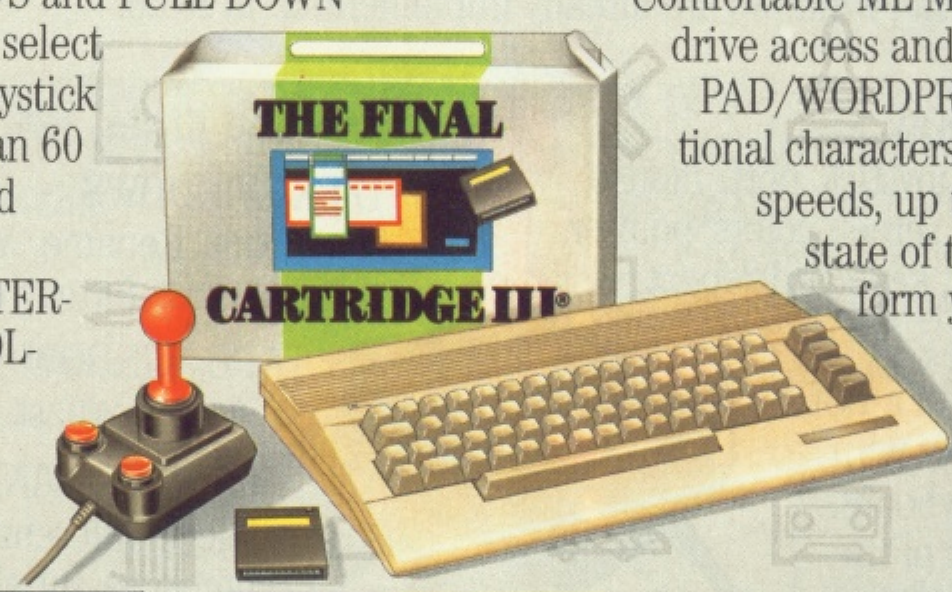
KEEP IT SIMPLE!



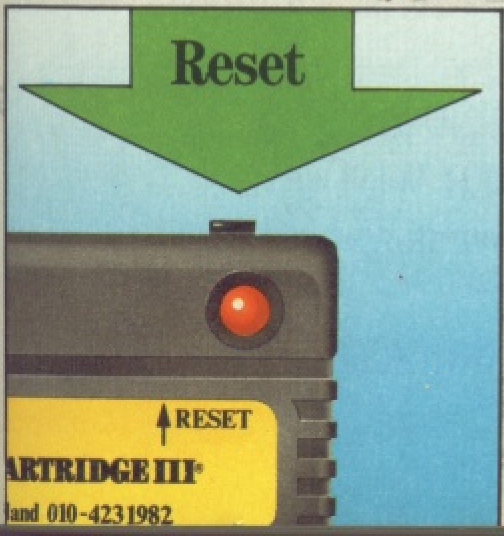
THE FINAL CARTRIDGE III®

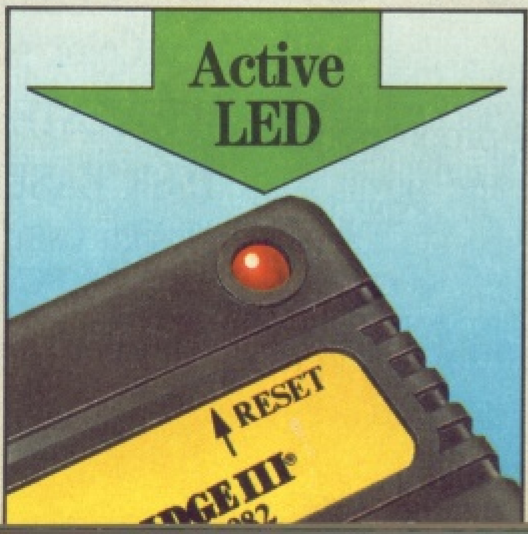
A POWERFUL 64K ROM BASED OPERATING SYSTEM FOR THE C64 AND C128[1)]

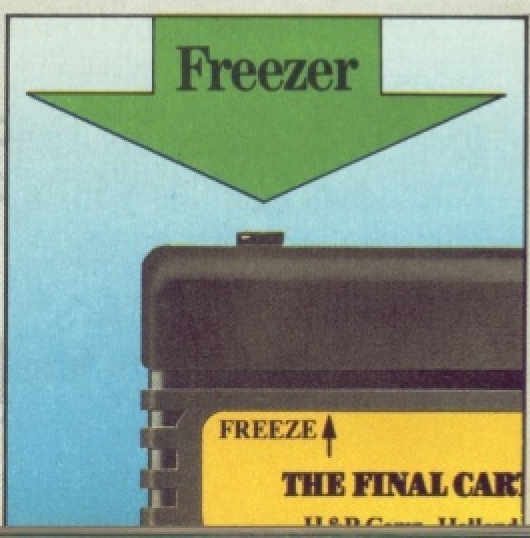
Easy to use WINDOWS and PULL DOWN MENUS allow you to select with either mouse, joystick or keyboard more than 60 new COMMANDS and FUNCTIONS.
Various PRINTER-INTERFACES, a BASIC TOOLKIT.



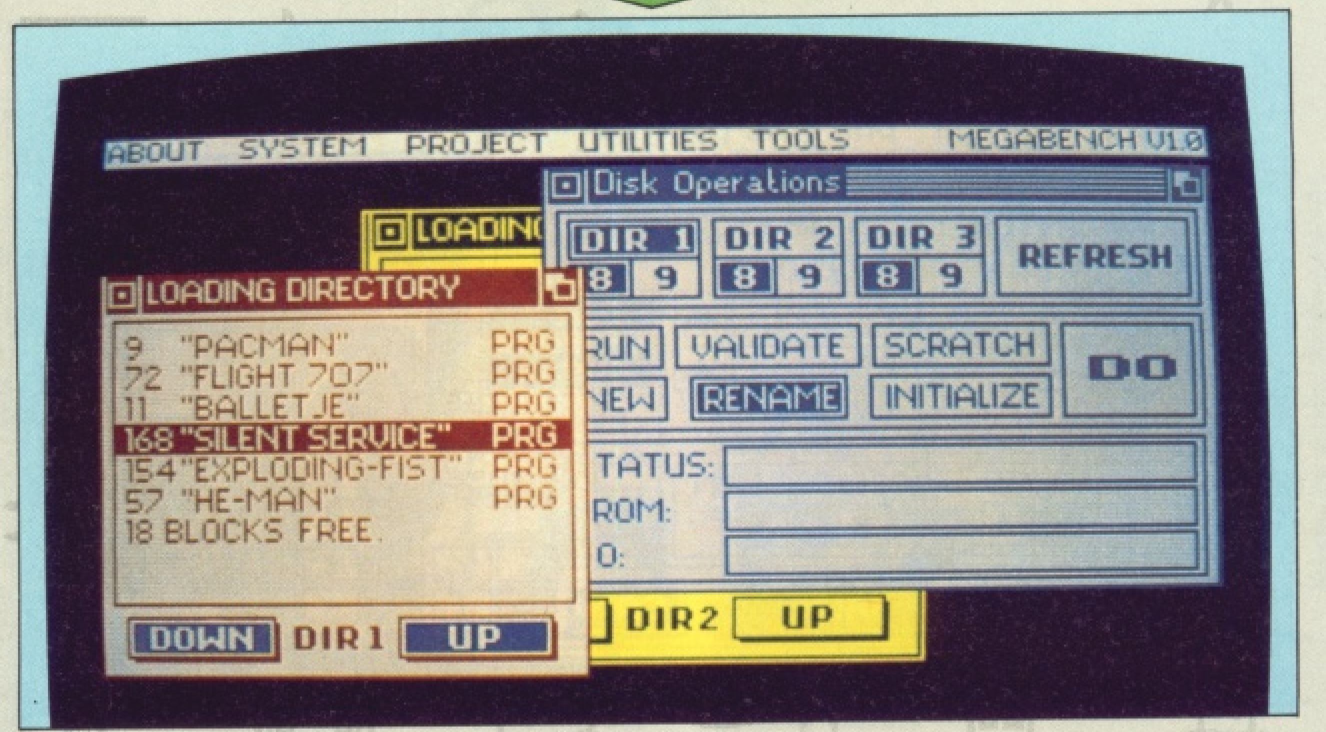
Comfortable ML MONITOR including 1541 drive access and sprite-editing, a NOTEPAD/WORDPROCESSOR with proportional characters, 2 DISKLOADERS with speeds, up to 15 times faster and a state of the art FREEZER. Transform your Commodore into a complete new - AMIGA LOOK ALIKE - system.





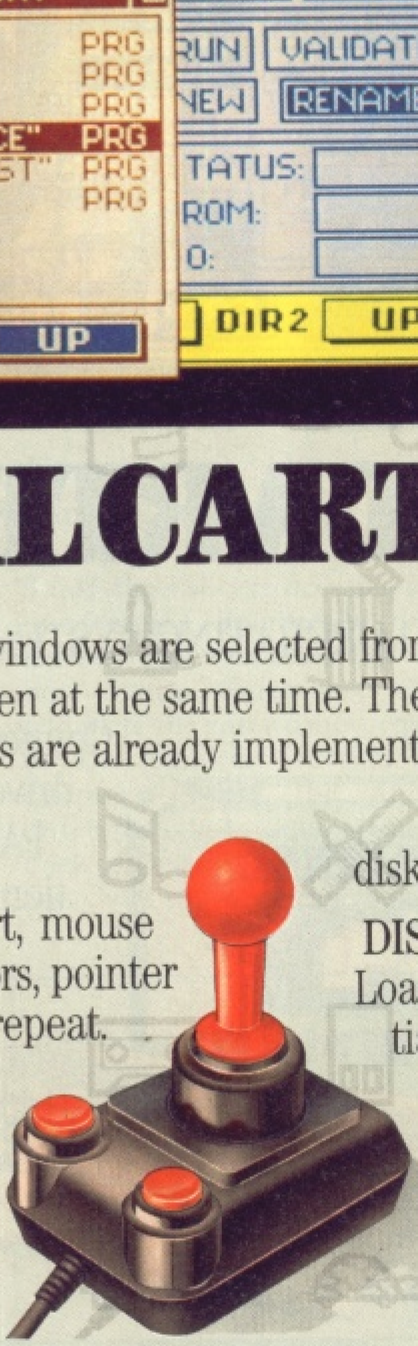


WINDOWS



THE FINAL CARTRIDGE III®

The high-resolution bit mapped windows are selected from a menu bar. An unlimited number of windows can be open on the screen at the same time. The windows can be freely moved on the screen. The following windows are already implemented in ROM:



PREFERENCE WINDOW
Selects: mouse port, joystick port, mouse speed, joystick speed, screen colors, pointer colors, keyboard click, keyboard repeat.

CALCULATOR
Complete simulation of a LCD-calculator. Input either with mouse, joystick or keyboard. The numeric key-pad of the C128 can be used in C64-mode.

NOTE PAD
Easy to use wordprocessor with proportional characters enables you to store and print small notes, letters, etc.

DIRECTORY WINDOWS
Enables you to open directories from different disks and drives, sort and print directories.

DISK WINDOWS
Load, Run, Rename, Validate, Scratch, Initialize, Fast format disks.

TAPE WINDOW
Activates fast and normal modes.

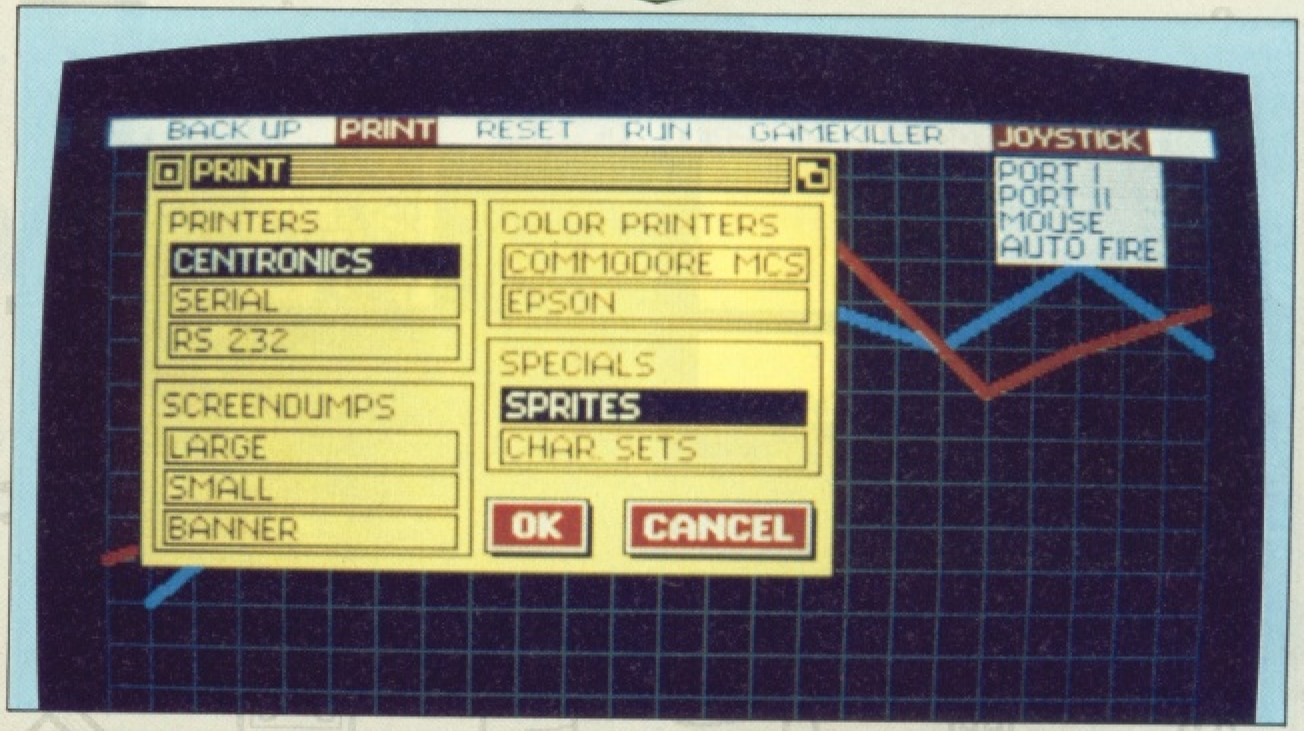
PRINTER WINDOWS
Select different printers, such as Commodore serial, Centronics, RS 232, Color printers.

REQUESTER WINDOWS

DISK BASED USER WINDOWS
Design your own windows.

CLOCK
Real Time Clock, with Alarm.

FREEZER MENU



THE FINAL CARTRIDGE III®

Innovative hardware, combined with smart software, allow you to freeze and continue every well-known C64-program. Freezer options include:

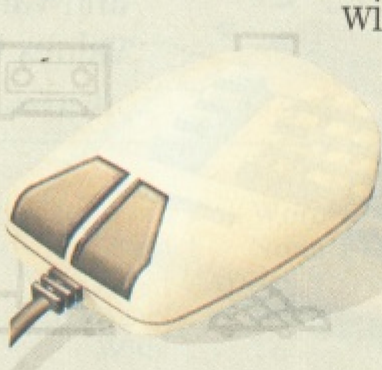
CENTRONICS/SERIAL/RS 232 SCREENDUMPS
• Full A4 printing • Variable printsize • Color printing • Sprite printing • Reverse printing • Color changes.

GAMEKILLER
• Kills sprite to sprite • and/or sprite to background collision • Can be started at any point in your game.

AUTO FIRE
• Transforms a normal joystick to an advanced auto fire engine.

JOYSTICK PORT CHANGER
• Never blow up your computer again by changing joystick ports while the C64 is running.

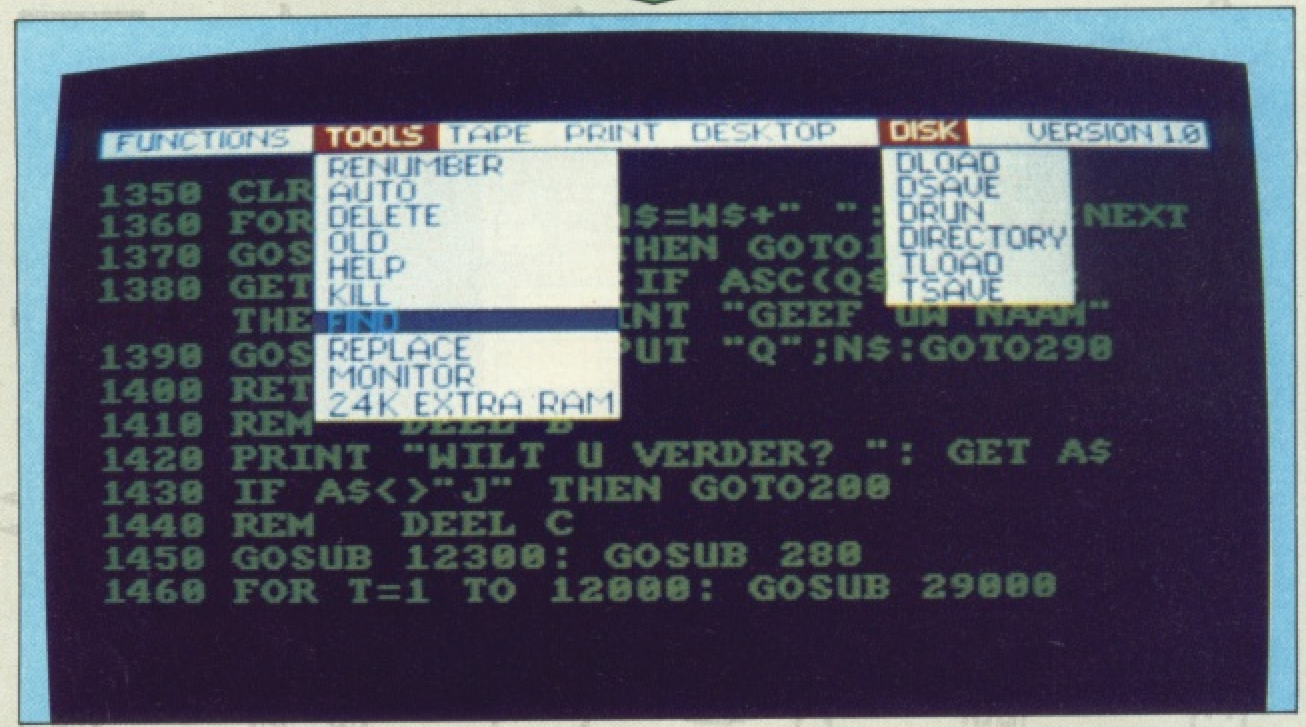
BACK UPS
• Disk to disk • Tape to disk • Disk to tape • Back up files are packed and reloadable without the Final Cartridge III • 60K in 15 sec. (disk) • Exits to Monitor or Basic.



ML MONITOR

Comfortable ML monitor. Does not reside in memory. Functions include:
• Scrolling up and down • 64K ROM/RAM access • Sprite editor • Character editor • Drive monitor • Fast loading and saving • Printer driver.

PULL DOWN MENU



THE FINAL CARTRIDGE III®

Almost all commands and functions that are not activated by windows can be selected from a menu bar, which appears on top of the screen after pressing the fire button, either in Basic or from the freezer. The following Basic Toolkit and keyboard extra's are included:

• Renumber • Auto • Delete • Old • Help • Kill • Find • Replace • 24K extra Ram for Basic • Append • DAppend • DSave • DOS • Monitor • Drive monitor • Sprite editing • Centronics interface • Fast format • Low Res screendumps • Plist • Scrolling up and down • Stops and continues listings • Preprogrammed functionkeys • Packer/Cruncher • Hex to decimal conversion • Pokes, syscalls and variables may all have Hexadecimal values • Trace, Dump, Order, Mem.

1) In 64 mode only. Colors simulated, specifications may change without notice.



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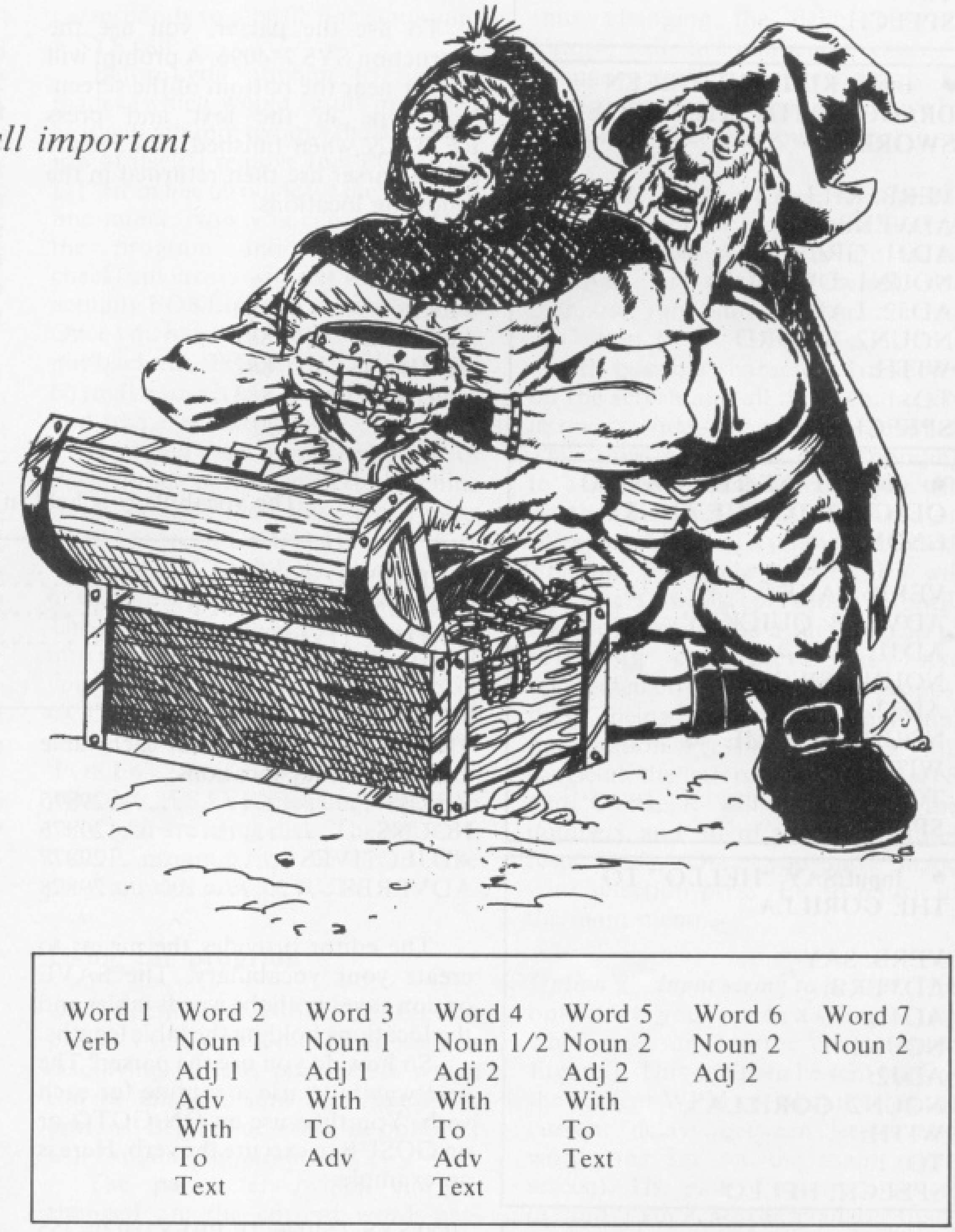
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Adventure Kit IV

This month we look at the all important role of the parser

By Allen Webb



The parser is one of most crucial parts of any adventure. This routine converts the input text into individual words and checks whether they are in the game's vocabulary. In my opinion there is an excessive amount of snobbery associated with parsers. The early Scott Adams games recognised only verb/noun combinations and were therefore tedious to use. Newer parers such as those in the Pawn are highly complex and will handle a wide range of inputs. I find that such complexity is unnecessary and some compromise is adequate. I will now go on to describe a parser which goes some of the way to provide acceptable performance.

In order to keep the code to a reasonable size, the parser makes certain assumptions as to the form of the text. These, however, are not unreasonable. The parser starts at the beginning of the sentence and scans each word in sequence. Any occurance of "the" is ignored and scanning continues until either seven acceptable words are found or until the end of the sentence is reached. Most words can be of differing forms and there are standard checking routines for each. The acceptable forms are:

Word 1	Word 2	Word 3	Word 4	Word 5	Word 6	Word 7
Verb	Noun 1	Noun 1	Noun 1/2	Noun 2	Noun 2	Noun 2
	Adj 1	Adj 1	Adj 2	Adj 2	Adj 2	
	Adv	With	With	With		
	With	To	To	To		
	To	Adv	Adv	Text		
	Text		Text			

The results of the scanning process are returned in eight registers. Registers NOUN1, NOUN2, ADJ1, ADJ2 and ADV hold the number of the relevant word. This number refers to the word's position in the vocabulary tables. The registers WITH and TO hold 1 if the corresponding word is present otherwise they hold 0. The spoke word is also checked. To indicate speech, the relevant text is enclosed in quotes. If

text is found, a register called TLEN returns the length of the text. The text is returned in a buffer.

I'll explain the parser's operation with some examples:

• Input: LOOK

VERB: LOOK
ADVERB:
ADJ1:
NOUN1:
ADJ2:
NOUN2:
WITH:
TO:
SPEECH:

• Input: KILL THE GREEN DRAGON WITH THE LARGE SWORD

VERB: KILL
ADVERB:
ADJ1: GREEN
NOUN1: DRAGON
ADJ2: LARGE
NOUN2: SWORD
WITH: 1
TO:
SPEECH:

• Input: TAKE THE SWORD QUICKLY TO THE ANGRY GNOME

VERB: TAKE
ADVERB: QUICKLY
ADJ1:
NOUN1: SWORD
ADJ2: ANGRY
NOUN2: GNOME
WITH:
TO: 1
SPEECH:

• Input:SAY "HELLO" TO THE GORILLA

VERB: SAY
ADVERB:
ADJ1:
NOUN1:
ADJ2:
NOUN2: GORILLA
WITH:
TO: 1
SPEECH: HELLO

• Input: ASK THE DWARF "WHAT IS THE TIME"

VERB: ASK
ADVERB:
ADJ1:
NOUN1:
ADJ2:
NOUN2: DWARF
WITH:
TO:
SPEECH: WHAT IS THE TIME

• Input: LOOK IN THE HOLE

VERB: LOOK
ADVERB: IN
ADJ1:
NOUN1:
ADJ2:
NOUN2: HOLE
WITH:
TO:
SPEECH:

To use the parser, you use the instruction SYS 7*4096. A prompt will appear near the bottom of the screen. You type in the text and press RETURN when finished. The results of the parser are then returned in the following locations:

Location	
VERB:	880
ADVERB:	881
ADJ1:	882
NOUN1:	883
ADJ2:	884
NOUN2:	885
WITH:	886
TO:	887
SPEECH:	starting at 49920
TLEN:	896
ERROR 1:	888
ERROR 2:	889
ERROR 3:	890
ERROR 4:	891
ERROR 5:	892
ERROR 6:	893
ERROR 7:	894
ERROR:	897

If a word is not recognised then the corresponding error register is set to 255 (it normally holds 0). ERROR1, for example, relates to WORD 1. All seven error registers are ORed together to get an overall error register (ERROR). This allows you to use a single value to check whether an input is acceptable. Lines 590 to 740 of the editor show how the parser can be used.

The parser code occupies the memory from $7000 to $74B2 (28672-29874).

The vocabulary is held in four tables as follows:

VERBS $7500-$78FF	255 words
NOUNS $7900-$7CFF	255 words
ADJECTIVES $7DOO-$7DFF	63 words
ADVERBS $7EOO-$7EFF	63 words

The numbers of words in each table are kept in four locations:

VERBS	29875
NOUNS	29876
ADJECTIVES	29877
ADVERBS	29878

The editor provides the means to create your vocabulary. The SAVE option saves both the words tables and the locations holding the table lengths.

So how do you use the parser? The best way is to use a routine for each verb. You then use an ON GOTO or on GOSUB to execute the verb. Here is an example:

```
1000 SYS 7*4096: IF PEEK(897)=255
THEn PRINT "ERROR IN INPUT":
GOTO 1000
1010 ON PEEK(880)
GOTO 2000,3000,4000.....
```

Each subroutine would then examine the rest of the input words and take appropriate action. The parser doesn't recognise synonyms, you'll have to do that.

The parser uses line 22 by default for the input. If you want to change this, include the following line in your program:

POKE 28722, LN

where LN is the prompt line and has values between 0 to 24. It is unwise to use a value greater than 23 since a long input will force the screen to scroll.

The use of the parser and the subsequent interpretation of text is the trickiest part of writing an adventure so be careful to think things through. Try to anticipate nonsensical inputs and try to use witty responses. There is nothing more tedious than getting a repeated reply such as "You can't do that" or "I don't understand".

In the final part of this series, I will look at windows and an interrupt driven event timer. YC

Morse Code Tutor

Practicing for telecommunication exams in morse code can be made easier with this utility

By Geoff Hackworth

Records and cassettes have been created to aid learning morse code, but the strings of letters soon become familiar after listening to them many times (as you would normally have to unless you were some kind of genius!). The solution is to find someone who can send you random letters in morse code but why bother when this computer program is all you need?

The Program

The program is designed to aid the learning of morse code by emiting random letters selected from a specific list which you have selected for the test. In this way you could learn the alphabet in stages. For example, selecting the letters ABCDEF means that the computer will randomly choose from this range when it tests you.

The program also provides the facility for the user to type in a string of text using any of the characters shown in Figure 1. The computer will now send this message instead of random letters. The string can be up to 717 characters in length (including any spaces). This allows a tutor to type in real words or messages for the learner to receive as a change from deciphering random characters.

Getting it in

The program is presented in the form of a Basic loader with each line of data having a checksum (to reduce errors). Once you've typed it all in, save the program to disk or cassette. Before I go on, some of you may have noticed that the actual machine code starts at 2049, the beginning of Basic! No, I'm not crazy, this is so you don't have to remember a SYS number whenever you want to use it. The very first part of the data in the loader program corresponds to a basic line containing a SYS call.

Before you attempt to run the loader (which would result in a crash as it will attempt to poke the data in on top of itself!) remove the 'POKEAD, DT' from line 60 but leave the rest of the line intact. Now you can safely RUN the program and sort out any checksum errors without the program actually POKEing the data anywhere. Once you have corrected all the errors, put back the 'POKEAD,DT' into line 60 (make sure it's in the original place) and resave the program.

Now you must move the bottom of Basic up out of the way of the machine code pokes. Do this by typing 'POKE6656,0:POKE43,1: POKE44,26:CLR:NEW'. Now LOAD in the Basic loader again and RUN it. The machine code will now be poked into memory. Once this has been done you now have to save the MORSE CODE program as a standalone program. To do this, type 'POKE43,1:POKE44,8:POKE45,135: POKE46,25:SAVE"filename"'. Add an ',8' if you are using disk. The MORSE CODE program will be saved. The program can now be RUN.

Using the program

Once operational, Morse Code Tutor presents you with a main menu screen displaying various parameters which can be changed and the three main options. Before I describe the options I will explain the parameters.

The parameters which can be changed are the current words-per-minute speed (WPM), the delay between letters and words (given in terms of 'dot' lengths) and the number of groups to be sent. The latter is only used in option 3 next page. The delay between words is always four more dots than the delay between letters, thus changing the delay between letters will automatically cause a change in the delay between words. To change the parameters use the keys F5 for the number of groups.

Option 1 – Select Characters for the test. This option enables the user to specify which characters are to be enabled or disabled when the computer randomly selects characters in Option 3.

All possible characters are shown on the screen and all those characters in reverse video are currently enabled. Thus pressing the key corresponding to a presently enabled character will set the character to normal video on screen to show that it is now deselected. Pressing 'F1' while pressing 'F3' will characters, whilst pressing 'F3' will disable them all. As a further help to selecting characters they are segregated on screen into three groups, these being letters, numbers and punctuation. Pressing 'CTRL+L' will toggle all the letters, while 'CTRL+N' and 'CTRL+P' will toggle all of the numbers and all of the punctuation respectively. Once you have made your selection press 'F8' to return to the main menu.

Option 2 – Input string to be sent. This option lets you type in a string of text which uses any of the characters in Figure 1. This can then be sent back at the current WPM speed and using the current delays between letters and words (as set on the main menu screen). The pair of square brackets ('[' and ']') indicate the available space for your text (717 characters).

Once you have finished typing in your text, pressing RETURN will send the string you have just typed in. You can press 'F8' to abort this stage and you are then asked for another string of text, your previous message is not

retained. You may press 'F8' again to return to the main menu screen.

Option 3 – Begin Test. This is the most powerful option, it will send you groups of five random characters (selected from those enabled in Option 1) at the current WPM speed, with the current delay between letters and words (as set on the main menu screen).

The number of groups setting on the main menu screen determines how many groups of five characters will be sent. Pressing '3' on the main screen will enter this option. You are asked to wait while the computer selects the characters which it is going to send to you (the border flashes during this process). This usually only takes a few seconds, but may be longer if you have only enabled a few characters in Option 1. If no characters are enabled then you are returned immediately to the main menu screen.

When the computer has finished sending the message it displays the characters it has sent, in groups of five, waiting for a keypress between each display. After all the groups have been displayed you are asked to press any key to return to the main menu screen. If, during the sending of the groups you press 'F8' then sending will stop and you are shown only the characters which were sent before 'F8' was pressed.

Please note that whenever the computer is asked to send any morse code (in either option 2 or 3) it calculates the timing according to the WPM speed, delays between letters and words and it also takes account of the average lengths, in time, of the characters which are currently enabled (Option 2 enables all of the characters because they may all be used). Thus when some combinations of characters are enabled and sent at a certain WPM and delay setting, the actual lengths of the dots and dashes may sound different when compared to those when other combinations of characters are selected. As an example of this, consider only the letters EIST as being enabled. In terms of 'length' in time they are short, so the individual dots and dashes will sound longer than if only the punctuation characters were enabled (which are much 'longer' than the letters EIST. So the program takes account of this fact when calculating how long to make each dot and dash. A similar effect is noticed when changing the delays between letters and words. A similar effect is noticed when changing the delays between letters and words. A larger delay causes the dots and dashes to be shorter so that the WPM setting is still accurate, ensuring that the same number of words is sent in the fixed amount of time. This may take some getting used to, but if the sending is too slow or too fast for you, just abort it and change the WPM speed to take account of the previous changes you made.

Note that in true morse the delay between letters is three dots, but I have allowed this to be extended so that the learner is given more time to think about what they have just heard before another character is sent. You should eventually be able to receive with the delay at three dots.

Also note that in morse code the delay between dots and dashes of a letter (i.e. the delay between the dot and the dash of the letter 'A') is equivalent in time to the length of a dot. A dash is always three times as long as a dot.

Figure 1

Char	Morse	Char	More
A	.-	Y	-.--
B	-...	Z	--..
C	-.-.	1	.----
D	-..	2	..---
E	.	3	...--
F	..-.	4	....-
G	--.	5	.....
H	....	6	-....
I	..	7	--...
J	.---	8	---..
K	-.-	9	----.
L	.-..	0	-----
M	--	.	.-.-.-
N	-.	,	--..--
O	---	:	---...
P	.--.	?	..--..
Q	--.-	'	.----.
R	.-.	—	-....-
S	...	/	-..-.
T	-	(	-.--.
U	..-	)	-.--.-
V	...-	=	-...-
W	.--	"	.-..-.
X	-..-		

Compilations

If value for money is the order of the day, cast your eye over our collection of compilation games and decide how to spend your Christmas cash

By Tony Hetherington

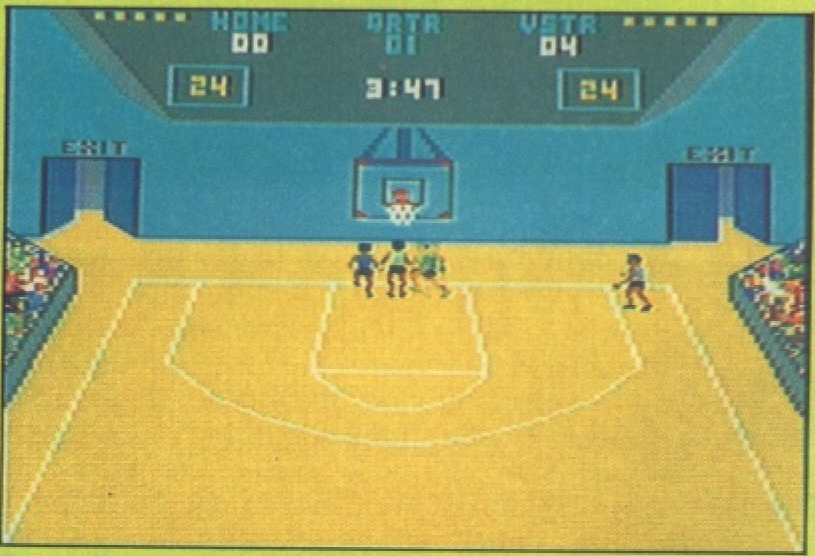
As the nights get longer and the days get colder the software houses turn to compilations that pack a punch to warm the cockles of your computer. The shop shelves are bulging with compilations that offer not only two games for the price of one but also four, six, eight, ten and twelve!

Last month's game of the month went to US Gold's Solid Gold Compilation that featured Winter Games, Ace of Aces, Infiltrator, Leader Board and Gauntlet; all for £9.99! Now this has been joined by compilations from the pick of the software houses that range from double packs to giant packs. We look at the top contenders for your Christmas cash.

Software Projects has compiled two double decks featuring both conversion of the video disk coin-op machine Dragon's Lair and the two games that are now part of software history. Manic Miner and the sequel Jet Set Willy started the Platform game craze in the UK and now you can get both of them for just £2.99!

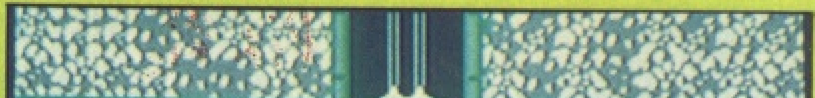
Dragon's Lair was the first video disk arcade machine in which Dirk the Daring battled through whirl pools, rode flying legless horses and finally defeated Singe the Dragon. Now you can tread in Dirk's footsteps in Dragon's Lair and Escape from Singe's Castle which together offer a comprehensive conversion of this coin-op classic.

Sports fans will find great value for money in Ocean's Game Set and Match which contains ten games and over 20 different events. First on the plate is Imagine's World Series Baseball, which is quickly followed by a set of Match Point and the excellent Jonah Barrington's Squash, a frame of Vision Snooker, a match of Super Soccer, a season of Gamestar's Two on Two Basketball, a game of Konami's Ping Pong and eight rounds of Activision's Barry McGuigan's Boxing. If you've got any stamina after that lot you can tackle Daley Thompson's Supertests that will have you shooting, cycling, diving, skiing, rowing, penalty kicking, ski jumping and tug o' warring with the great man. Or you can try the swimming, skeet shooting, weight lifting and archery of Hyper Sports. Guaranteed to break your joystick but not the bank.



Two on Two

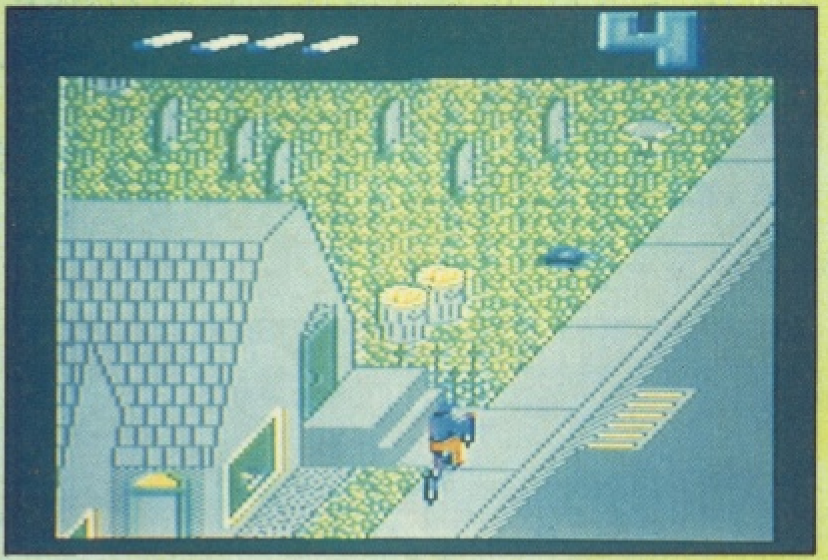
Two on Two Basketball is also available on the Gamestar (Activision) Sportspack that also contains Championship Baseball and GFL Championship Football (American).



Impossible Mission

Hypersports was one of the last "events" games from Ocean (Konami) who started it all with Daley Thompson's Decathlon. Since then American giants, Epyx, has taken over with its series of Winter Games, World Games and now California Games. Its first, Summer Games, just missed out on the Decathlon craze but is now back on the Epyx Epics compilation from US Gold which also includes the high speed, split screen, racing action of Pitstop II, the superb walking, talking, fiendish Impossible Mission and the Moon Walks and Head Spins of Breadance.

If Epyx has dominated the sports scene then there can be no doubt that Elite is the King of the coin-op conversions. Now you can buy the best of Elite for only £14.99. In a double tape pack you get one of my all time favourites, Paperboy along with Frank Bruno's Boxing, Commando, Bombjack, Airwolf, Ghosts and Goblins, Space Harrier and Bombjack II!

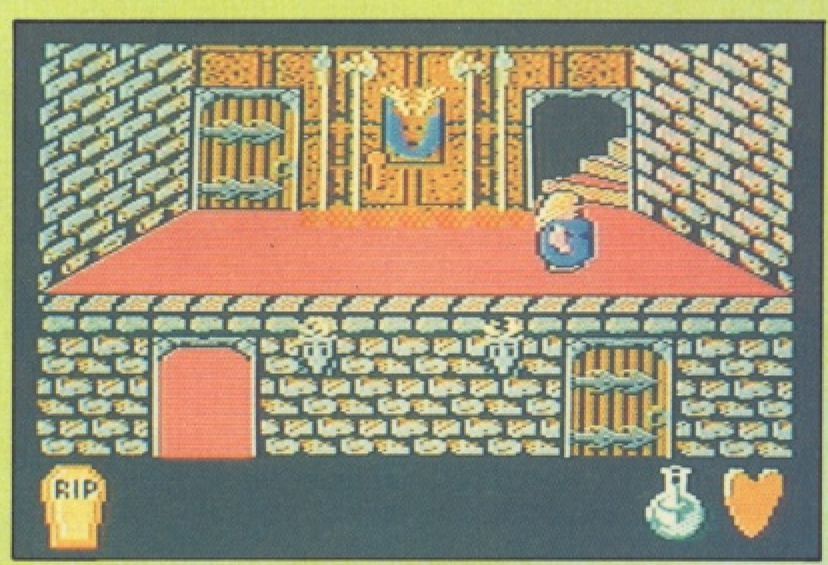


Paper Boy

If you think eight games for the price of one is good value then what about Beau Jolly's ten Computer Hits 4 which now includes two free games bringing the total to 12 games for £9.95! Remember Hewson's futuristic racing shoot 'em up called Alleykat, Martech's judo game Uchi Mata and Electric Dream's Spindizzy? Well, they're joined by Bride of Frankenstein (Reaktor), Classic Snooker and Magic Madness (Anco), Sacred Armour of Antiriad (Palace), Deactivators (Ariolasoft), Skaterock and Starquake (Bubblebus), Hewson style Minter Madness in Iridis Alpha and Dandy (Electric Dreams) which are all packed on to a single tape.

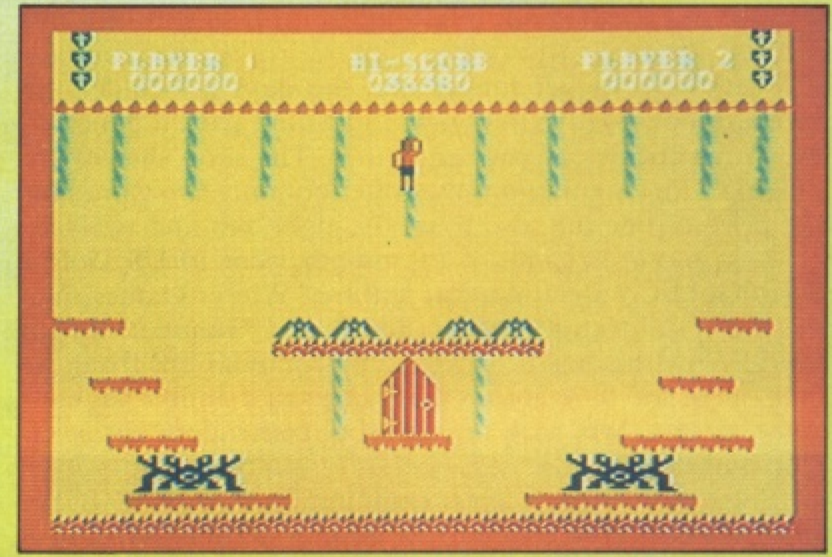


Uchi Mata



Bride of Frankenstein

Ocean offer action and adventure all the way in their Live Ammo (£9.95) compilation in which you can carry out Army Moves, blast anything in sight as Rambo or as Green Beret, take to the skies in the dogfight action of breakout of a POW camp in the Great Escape. Choose your weapons, my pick would be the tense prisoner of war adventure of The Great Escape.



Power House

The Power House consider their compilation of eight budget games a "software album" and so the games on Power Plays are still available individually or you get the lot and save yourself some cash. For your money you'll get one of the most addictive platform games ever written in



Battle of Britain

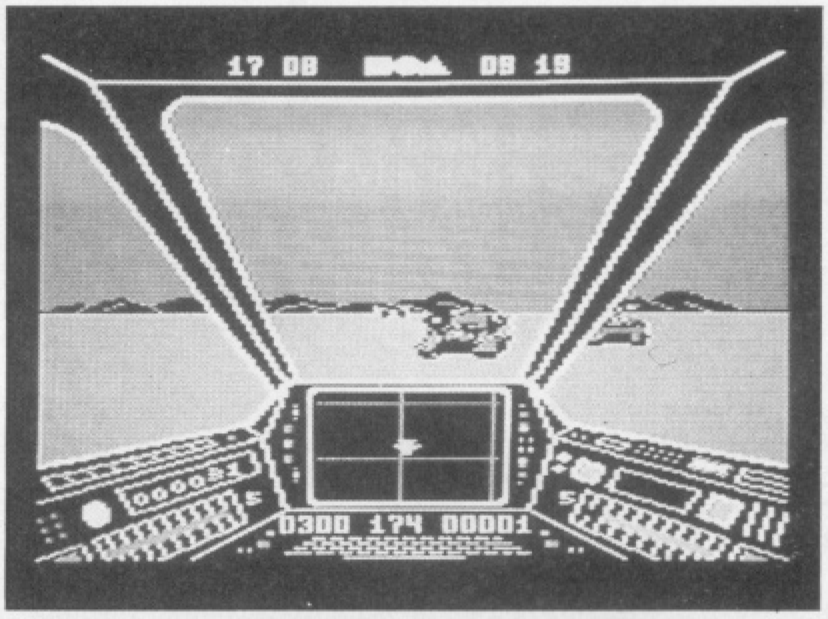
Hercules and its sequel God's and Heroes, the shoot 'em ups Terminator, Aftermath, Space Warrior, Xenon Ranger and Gun Runner and the puzzling maze exploration game Squij!

Wargamers needn't feel left out of the compilations craze as PSS have released Conflicts 1 containing three strategic simulations. Now you can recreate the Battle of Britain, the conquest of Falklands 82 and fight the controversial Theatre Europe all for the cost of a single cassette.

Ten great games for the price of one is the offer from Gremlin Graphics. If you take it up, and you should, you'll be able to delve into the Gauntlet clone Avenger, explore the scrolling platform game shoot 'em up adventure that's Future Knight, knock the bricks out of Krakout, bounce to glory in Bounde and shoot to the top in Footballer of the Year. If you've got any life left in your joystick after that lot you can run the race of your life in the exceptional Trailblazer, blast the 3D nasties of Highway Encounter, join Monty on the Run, rob the West Bank or be as naughty as you can as Jack the Nipper. Krakout, Bounder, Future Knight and Trailblazer have got to be worth £9.99 on their own and with games like Avenger and Monty on the Run as a bonus it just has to be a winner.

US Gold has another compilation of past hits but you'll have to search out the nearest WH Smiths to find it as Play it Again is only available there. For your £9.99 you'll receive a pack that contains the murder mystery Killed Until Dead, 10th Frame (Ten Pin Bowling C64 style), English Software's Leviathan, Infiltrator and the hit and hope Access golf smash Leader Board as well as the four extra courses included in Leader Board Tournament.

Finally, you can pick up a compilation of ten games and help the fight against cruelty to children. As you play games such as Bounty Bob Strikes Back (US Gold), Skyfox (Electronic Arts), Monty on the Run (Gremlin) and Elektraglide (English) the proceeds of the sales will be helping the NSPCC and RSPCC to stamp out cruelty to kids. It couldn't be easier, in fact, it's kidsplay.



Skyfox

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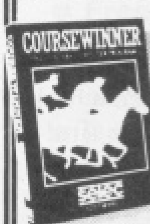
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The *Your Commodore* Software Service makes available all of the programs from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

INFONET LTD, 5 River Park Estate, Berkhamsted, Herts HP4 1HL.
TEL: (0447) 76661

Please contact this address for prices and availability.

The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format, you will also find a couple of symbols after this strap. The symbols have the following meaning:

This symbol means that the program is available on cassette.

These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk-only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape.

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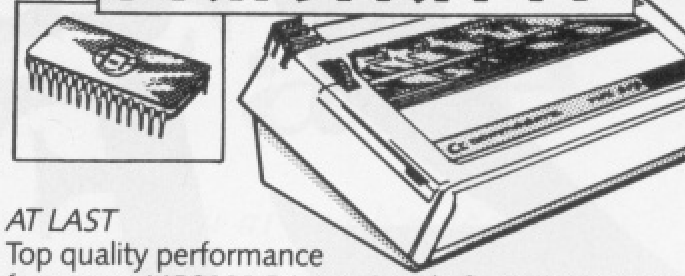
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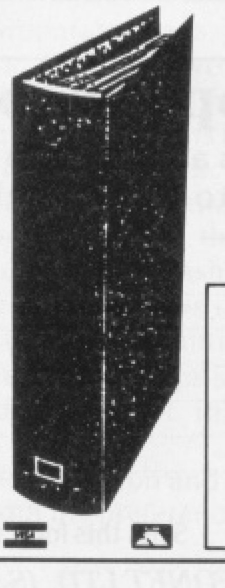
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Poker Face

If your latest game always leaves you at death's door, this could pull you through!

By Norman Doyle

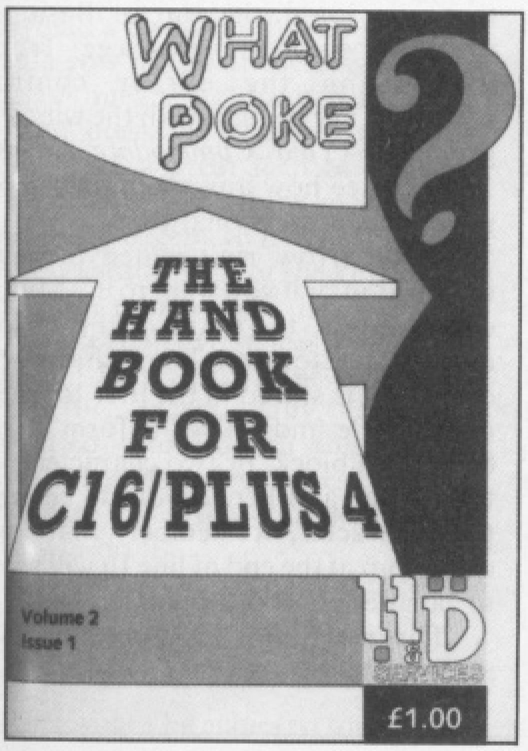
Is it a book? Is it a magazine? No, it's *What Poke?* – a collection of hints, tips, cheats and potted reviews from H & D Services.

Once upon a time, the computer gaming fraternity used to be an unofficial gentleman's club. Games were there to play and cheats were frowned upon. This has all changed since people realised that some games are impossible without a little assistance and now the caddish pastime of PEEKs and POKEs has become a major, magazine money-spinner.

What Poke? strips away the trimmings of the traditional magazine and concentrates heavily on maps, hints, solutions and, of course, the pokes themselves.

Despite classifying itself as a magazine, the editorial team are out to bust the image of the A4 format by printing as an A5 booklet. This has the advantage of producing a stiff-backed handbook which is easily stored on your bookshelf.

The series of books are broken down into subject areas. C16 owners have a separate issue from C64 owners, and adventures are treated on their own as a specialist pursuit.



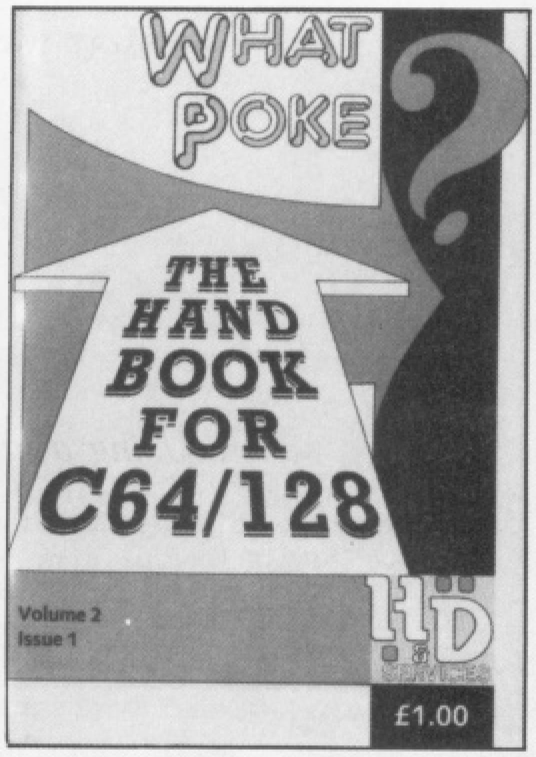
In the 70 pages of the first issue of the C64 Volume 2, there are 41 pokes, seven maps, two hints and two solutions. The rest of the magazine consists of reviews and features written in a very sketchy fashion.

After reading the Kill! Kill! Kill! attitude towards traditional magazines in the introductory pages, I expected a little more acidity. The editorial implies that the established monthlies are in the pockets of the advertisers. Although this may be true



of one or two less reputable rags, I know that this is a popular myth. Some companies do get soft treatment at the hands of the reviewers but this is a result of a generally good track record. It's very similar to the way that a U2 fan would never admit that the band has produced a few trashy records. At least one of the reviews in *What Poke?* shows a sycophantic attitude towards Hewson's Zynaps so they can't claim to be free of this reviewer's disease.

A review is personal opinion and I would wax lyrical about my preference



for the colour blue although I know other people would disagree.

The reviews are 'bottom liners', they say nothing much about the game and then you are given the opinions of a panel of reviewers. Taking the overall impression, it just goes to prove that one man's meat is another man's poison. The review of Reaktor's Killer Ring, for example has comments ranging from 'totally average' to 'an excellent shoot-em-up'.

Still, this is not the purpose of *What Poke?* Its main fare is cheats and lots of them. If this is your main aim in life, the magazine delivers the goods but I feel that you're still paying for a fair degree of wallpaper compared to the traditional, colourful, informative monthly magazine. Despite its thickness, *What Poke?* has not transcended its beginnings as a broadsheet, only the price has changed.

Touchline:
Name: *What Poke?* ***Publisher:*** *H & D Services, 1338 Ashton Old Road, Higher Openshaw, Manchester M11 1JG.* ***Price:*** *£1.00.*

Get The Point

Using a pointer to select menu options turns a mundane task into a pleasure.

By Martin Reddy

The Amiga uses an arrow to select options from the screen and the pull-down menus. You don't have to buy GEOS to add this to your C64 when just 536 bytes of program will do the job for you.

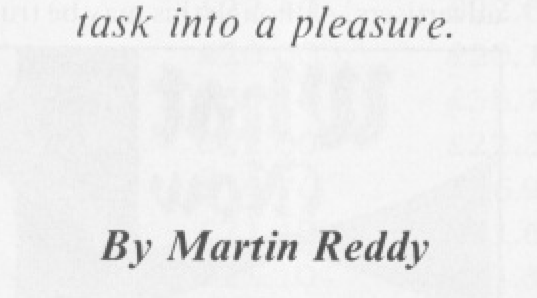
This program runs on an interrupt and allows as much flexibility as possible. Under program control or in direct mode, you can either find the character under the arrow or retrieve the XY co-ordinates of the arrow.

PEEKing location 820 will reveal the screen code of the character under the arrow cursor. If this is not required, then PEEK(822) will reveal the X co-ordinate of the cursor position while 823 stores the Y co-ordinate.

As this routine can be put to many uses, the cursor colour may need to be changed according to the background. Any colour can be selected simply by poking its numerical value into location 821.

The speed of the arrow can also be altered through location 40307 ($9D73). This contains the default value of 8 at first but any value from 1 to 255 can be poked in. The rule to follow is that the lower the value, the faster the speed at which the cursor moves.

The program is stored at the top of the Basic memory at locations 40000 to



40535 ($9C40-$9E57). This means that it will work in conjunction with most machine code and Basic programs. In the latter case you should make sure that you lower the top of Basic to prevent variable storage from overwriting the cursor control program. Try using it with the window generator (*Your Commodore* August 1987) to see how any program can be given that professional touch.

If an arrow isn't suited to your application or if you want to use Multi-colour mode, the shape of the cursor can be altered. The character definition is stored in the first 16 bytes of the code and takes the form of an 8x16 pixel block, or two characters on top of one another. If you do change the character, remember that the checksum at the end of line 10 will have to be altered accordingly.

The interrupt is set in operation by SYS 40000.

Listings

Get it right first time with our deluxe program system for the C64.

You may have noticed that our listings are free of those horrible little black blobs which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. Fret no more, it's all part of our easy entry aid.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an ace of spades in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:

[CTRL N, DOWN2,LEFT5,BLUE, F3,C3]

This would be achieved by holding down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

[SS],[C*]

In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 2) and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON), type the relevant number of reversed T's and then hold down CTRL and press zero (RVSOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string: the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

:CC=2*[PI]*R:

Ignore the square brackets and just type in a shifted upward pointing arrow (ie. the pi symbol).

```
PROGRAM: SYNTAX CHECKER

 5 REM SYTAX CHECKER - ERIC DOYLE

 10 BL=10    :LN=70    :SA=49152
 20 FOR L=0 TO BL:CX=0:FOR D=0 TO
  15
 30 READ A:IF A>255THENPRINT"NUMB
ER TO LARGE";LN+(L*10):STOP
 40 CX=CX+A:POKE SA+L*16+D,A:NEXT
  D
 50 READ A:IF A><CX THENPRINT"ERR
OR IN LINE";LN+(L*10):STOP
 60 NEXT L:SYS 49152:NEW
 70 DATA 173,5,3,201,165,208,31,1
20,169,9,141,32,208,141,33,208,1
847
 80 DATA 169,7,141,134,2,169,13,3
2,210,255,169,64,141,4,3,169,168
2
 90 DATA 192,141,5,3,88,96,120,16
9,124,141,4,3,169,165,141,5,1566

 100 DATA 3,169,14,141,134,2,141,
32,208,169,6,141,33,208,88,96,15
85
 110 DATA 32,124,165,72,138,72,15
2,72,162,0,165,20,133,254,165,21
,1747
 120 DATA 24,101,254,133,254,189,
0,2,240,18,69,254,133,254,232,18
9,2346
 130 DATA 0,2,240,8,24,101,254,13
3,254,232,208,233,169,1,141,134,
2134
 140 DATA 2,165,254,74,74,74,74,3
2,156,192,32,210,255,165,254,41,
2054
 150 DATA 15,32,156,192,32,210,25
5,169,13,32,210,255,169,13,32,21
0,1995
 160 DATA 255,169,7,141,134,2,104
,168,104,170,104,96,24,105,48,20
1,1832
 170 DATA 58,16,1,96,24,105,7,96,
0,0,0,0,0,0,0,0,403
```

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

Lower Case

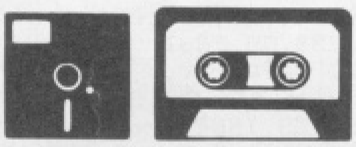
Many of the listings are presented in lower case. To turn your computer to lower case mode press the Commodore key and the SHIFT key at the same time. YC

Mnemonic	Symbol	Keypress
[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		f1 key
[F2]		SHIFT & f1 key
[F3]		f3 key
[F4]		SHIFT & f3 key
[F5]		f5 key
[F6]		SHIFT & f5 key
[F7]		f7 key
[F8]		SHIFT & f7 key
[HOME]		CLR/HOME
[CLR]		SHIFT & CLR/HOME
[RVSON]		CTRL & 9
[RVSOFF]		CTRL & 0

Mnemonic	Symbol	Keypress
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8
[POUND]		£
[LARROW]		←
[UPARROW]		↑
[PI]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		see text
[Cletter]		CBM + letter
[Sletter]		SHIFT + letter

YOUR COMMODORE Listings

Get The Point



PROGRAM: GET THE POINT

```
11  10 REM *********************
    *********
18  20 REM *       GET THE POINT
    *
EF  30 REM * PROGRAMMED BY MARTI
    N REDDY *
B7  40 REM *********************
    *********
2B  50 REM        SYS 40000 TO STÅ
    RT
3E  60 CLR:FORY=0TO34:FORX=0TO15
    :READA
38  70 C=C+A:POKE39984+Y*16+X,A:
    NEXTX
DC  80 READA:IFA<>CTHENPRINT"?ER
    ROR IN LINE"100+Y*10:END
69  90 C=0:NEXTY:PRINT"O.K."
0B  100 DATA128,192,192,224,240,
    240,248,252,252,254,248,216,
    28,12,14,4,2744
CC  110 DATA76,92,157,169,45,133
    ,51,133,55,169,156,133,52,13
    3,52,162,1768
3A  120 DATA62,169,0,157,191,2,2
    02,208,250,162,0,168,189,48,
    156,153,2117
00  130 DATA192,2,232,200,200,20
    0,224,16,208,242,173,53,3,14
    1,46,208,2340
19  140 DATA169,11,141,255,7,173
    ,14,208,208,5,169,24,141,14,
    208,173,1920
D4  150 DATA15,208,208,17,169,50
    ,141,15,208,173,16,208,41,12
    7,141,16,1753
BE  160 DATA208,169,0,133,2,173,
    21,208,9,128,141,21,208,96,1
    73,15,1705
1F  170 DATA208,201,246,208,1,96
    ,238,15,208,96,173,15,208,20
    1,50,208,2372
A6  180 DATA1,96,206,15,208,96,1
    65,2,201,116,48,17,173,16,20
    8,9,1577
5B  190 DATA128,141,16,208,165,2
    ,233,116,10,141,14,208,96,17
    3,16,208,1875
CE  200 DATA41,127,141,16,208,16
    5,2,10,105,24,141,14,208,96,
    165,2,1465
93  210 DATA208,1,96,198,2,76,18
    2,156,165,2,201,158,208,1,96
    ,230,1980
7D  220 DATA2,76,182,156,173,0,2
    20,201,126,208,3,76,170,156,
    201,125,2075
E5  230 DATA208,3,76,158,156,201
    ,123,208,3,76,222,156,201,11
    9,208,3,2121
44  240 DATA76,232,156,201,122,2
    08,6,32,170,156,76,222,156,2
    01,121,208,2343
F8  250 DATA6,32,158,156,76,222,
    156,201,118,208,6,32,170,156
    ,76,232,2005
B8  260 DATA156,201,117,208,6,32
    ,158,156,76,232,156,96,32,22
    8,255,201,2310
F8  270 DATA17,208,3,76,158,156,
    201,29,208,3,76,232,156,201,
    145,208,2077
69  280 DATA3,76,170,156,201,157
    ,208,3,76,222,156,96,32,67,1
    56,32,1811
FC  290 DATA244,156,32,60,157,16
    5,197,201,60,240,22,173,0,22
    0,201,112,2240
E6  300 DATA48,15,160,8,162,100,
    234,234,202,208,251,136,208,
    246,76,95,2383
AC  310 DATA157,165,2,74,74,141,
    54,3,173,15,208,233,50,74,74
    ,74,1571
84  320 DATA141,55,3,173,15,208,
    201,50,208,5,169,0,141,55,3,
    160,1587
4A  330 DATA4,173,55,3,208,5,173
    ,54,3,144,33,173,55,3,141,16
    7,1394
07  340 DATA2,10,10,10,141,56,3,
    162,5,173,167,2,10,144,1,200
    ,1096
1E  350 DATA141,167,2,202,208,24
    3,109,56,3,144,1,200,109,54,
    3,144,1786
F7  360 DATA1,200,141,168,2,140,
    169,2,173,168,2,237,169,2,10
    5,4,1683
E8  370 DATA141,168,2,173,55,3,2
    01,16,48,6,238,169,2,238,168
    ,2,1630
19  380 DATA173,168,2,208,3,238,
    168,2,201,1,208,3,238,168,2,
    201,1984
74  390 DATA2,208,3,238,168,2,20
    1,3,208,3,238,168,2,201,255,
    208,2108
91  400 DATA24,173,55,3,240,16,2
    01,16,240,12,201,8,240,8,201
    ,32,1670
5C  410 DATA240,4,169,0,240,3,23
    8,168,2,173,168,2,201,254,20
    8,13,2083
7B  420 DATA173,54,3,201,31,208,
    6,206,169,2,238,168,2,173,16
    8,2,1804
53  430 DATA141,74,158,173,169,2
    ,141,75,158,173,0,0,141,52,3
    ,173,1633
87  440 DATA21,208,41,127,141,21
    ,208,96,0,0,0,0,0,0,0,0,863
```

Through The Round Window

Getting it all in

1) Type in and save the program WEOS BOOT
   If using cassette change the ,8,1 after the LOAD to ,1,1
2) Type in WEOS LOADER 1 and 2 and save them. If using tape save them on a different tape than WEOS BOOT.
   If using tape remember to change the ,8,1 to ,1,1 as indicated in LOADER 2
3) Turn OFF and ON your machine.
4) Load and run WEOS LOADER 1
5) Load and run WEOS LOADER 2
   When finished this will ask you to PRESS A KEY TO SAVE.
   When a key is pressed the program WEOBASIC.CODE will be saved.
   If using tape then this should be saved immediately after the program WEOS BOOT.

PROGRAM: WEOS BOOT

```
0C 100 PRINTCHR$(14)CHR$(8)CHR$(147)
91 110 PRINT"[HOME,DOWN6,RIGHTS,SW]EOSBASIC IS LOADING..."
DB 120 A=A+1:IF A=1 THEN LOAD"WEOBASIC.CODE",8,1
04 130 SYS 64738
```

PROGRAM:WEOS LOADER 1

```
22 10 BL=234:LN=50:SA=32768
5B 20 FOR L=0 TO BL:CX=0:FOR D=0 TO 15:READ A:CX=CX+A:POKE SA+L*16+D,A:NEXT D
A5 30 READ A:IF A><CX THENPRINT"ERROR IN LINE";LN+(L*10):STOP
40 40 NEXT L:END
E2 50 DATA 166,128,57,128,195,194,205,56,48,139,227,131,164,245,130,156,2369
22 60 DATA 130,96,130,31,130,76,72,178,0,107,143,68,128,71,254,74,1688
F8 70 DATA 243,145,242,14,242,80,242,51,243,87,241,202,241,237,246,62,2818
C3 80 DATA 241,47,243,68,128,165,244,237,245,32,188,246,32,225,255,240,2836
A7 90 DATA 3,76,114,254,32,163,253,32,24,229,32,115,128,32,204,255,1946
16 100 DATA 169,0,133,19,32,122,166,88,32,208,153,32,242,128,169,0,1693
33 110 DATA 141,32,208,141,33,208,169,5,141,134,2,32,254,128,162,128,1918
61 120 DATA 76,136,227,162,21,160,128,134,195,132,196,160,35,177,195,153,2287
1E 130 DATA 16,3,136,16,248,169,72,160,235,141,143,2,140,144,2,96,1723
5A 140 DATA 170,169,13,32,210,255,138,10,170,189,192,140,168,189,191,140,2376
EB 150 DATA 32,30,171,76,98,164,142,22,208,32,163,253,32,80,253,32,1788
91 160 DATA 91,255,32,115,128,88,32,242,128,32,191,227,32,94,153,169,2009
41 170 DATA 128,133,52,133,56,133,54,169,1,133,43,169,4,133,44,169,1554
02 180 DATA 0,141,0,4,133,51,133,53,133,55,141,32,208,141,33,208,1466
0A 190 DATA 169,5,141,134,2,169,2,160,155,32,45,228,162,251,154,76,1885
1C 200 DATA 107,128,162,11,189,9,128,157,0,3,202,16,247,96,162,120,1737
F3 210 DATA 169,0,157,100,148,202,208,250,96,82,85,206,67,76,211,67,2124
A2 220 DATA 85,82,83,79,210,67,79,76,79,85,210,80,79,73,78,84,1529
A7 230 DATA 69,210,79,76,196,77,69,78,213,83,79,80,69,206,83,67,1734
FC 240 DATA 76,79,83,197,87,79,80,69,206,87,67,76,79,83,197,87,1632
D7 250 DATA 83,87,65,208,87,67,79,80,217,87,77,79,86,197,68,69,1636
3E 260 DATA 83,203,87,80,82,73,78,212,87,69,79,211,79,70,198,68,1759
96 270 DATA 73,83,203,68,73,210,80,65,85,83,197,73,78,86,69,82,1608
CE 280 DATA 83,197,77,79,86,66,76,203,87,73,78,68,79,215,77,79,1623
25 290 DATA 85,83,197,84,89,80,197,66,85,84,84,79,206,83,67,82,1651
56 300 DATA 206,67,72,69,67,203,67,80,79,211,0,63,66,65,68,32,1415
8D 310 DATA 87,73,78,68,79,87,32,80,65,82,65,83,0,63,87,73,1102
05 320 DATA 78,68,79,87,83,32,78,79,84,32,79,80,69,78,0,63,1069
54 330 DATA 77,69,78,85,32,83,89,78,84,65,88,0,63,66,65,68,1090
4C 340 DATA 32,87,73,78,68,79,87,0,63,77,69,78,85,32,78,79,1065
E3 350 DATA 84,32,68,69,70,73,78,69,68,0,0,63,87,73,78,68,980
32 360 DATA 79,87,32,79,80,69,78,69,68,0,63,84,79,79,32,77,1055
1D 370 DATA 65,78,89,32,87,73,78,68,79,87,83,0,63,87,73,78,1120
39 380 DATA 68,79,87,32,78,79,84,32,67,76,79,83,69,68,0,169,1150
65 390 DATA 0,133,13,32,115,0,201,238,240,6,32,121,0,76,141,174,1522
7B 400 DATA 230,122,208,2,230,123,160,0,177,122,201,7,208,2,169,31,1992
64 410 DATA 201,24,176,3,76,8,175,133,36,169,173,72,169,140,72,198,1825
D2 420 DATA 36,165,36,10,170,189,128,140,72,189,127,140,72,76,115,0,1665
A2 430 DATA 32,115,0,32,105,130,76,174,167,201,238,208,33,230,122,208,2071
59 440 DATA 2,230,123,160,0,177,122,201,24,144,3,76,8,175,56,233,1734
A4 450 DATA 1,10,168,185,128,140,72,185,127,140,72,76,115,0,201,139,1759
29 460 DATA 208,4,169,32,208,232,32,121,0,76,237,167,48,3,76,243,1856
7B 470 DATA 166,201,255,240,249,36,15,48,245,201,238,240,5,32,215,130,2516
86 480 DATA 48,3,32,184,130,76,239,166,200,177,95,170,132,73,160,255,2140
05 490 DATA 202,240,8,200,185,9,129,16,250,48,245,200,185,9,129,48,2103
C1 500 DATA 5,32,210,255,208,245,96,56,233,127,170,132,73,160,255,202,2459
C2 510 DATA 240,8,200,185,158,160,16,250,48,245,200,185,158,160,48,230,2491
44 520 DATA 32,210,255,208,245,166,122,160,4,132,15,189,0,2,16,7,1763
AD 530 DATA 201,255,240,43,232,208,244,201,32,240,36,133,8,201,34,240,2548
89 540 DATA 71,36,15,112,26,201,63,208,4,169,153,208,18,201,48,144,1677
BC 550 DATA 4,201,60,144,10,76,114,131,169,238,44,5,11,164,113,232,1716
FB 560 DATA 200,153,251,1,201,238,240,49,185,251,1,240,34,56,233,58,2391
CE 570 DATA 240,4,201,73,208,2,133,15,56,233,85,208,174,133,8,189,1962
33 580 DATA 0,2,240,219,197,8,240,215,200,153,251,1,232,208,240,153,2559
B1 590 DATA 253,1,198,123,169,255,133,122,96,165,11,200,153,251,1,76,2207
2C 600 DATA 251,130,132,113,160,255,134,122,202,169,1,133,11,200,232,189,2434
73 610 DATA 0,2,56,249,9,129,240,245,201,128,240,156,166,122,230,11,2184
8B 620 DATA 200,185,8,129,16,250,185,9,129,208,228,160,0,132,11,136,1986
A6 630 DATA 166,122,202,200,232,189,0,2,56,249,158,160,240,245,201,128,2550
1C 640 DATA 208,3,76,43,131,166,122,230,11,200,185,157,160,16,250,185,2143
C2 650 DATA 158,160,208,225,189,0,2,76,45,131,32,253,174,32,158,183,2026
7D 660 DATA 224,16,176,1,96,162,14,76,55,164,133,99,132,98,169,0,1615
21 670 DATA 133,13,133,14,162,144,56,76,73,188,32,138,173,76,247,183,1841
58 680 DATA 32,253,174,32,158,173,76,166,182,32,253,174,76,158,183,173,2295
EA 690 DATA 134,2,141,110,148,141,111,148,169,0,141,121,148,32,121,0,1667
54 700 DATA 201,44,240,1,96,32,115,0,201,44,240,6,32,205,131,142,1730
B5 710 DATA 110,148,32,121,0,201,44,240,1,96,32,249,131,224,2,176,1807
7C 720 DATA 18,142,121,148,32,121,0,201,44,240,1,96,32,202,131,142,1671
41 730 DATA 111,148,96,76,182,1
```

```
    33,173,104,148,240,6,201,6,2
    40,4,24,1892
F9  740 DATA 96,56,96,169,3,76,1
    44,128,76,8,175,173,104,148,
    201,5,1658
57  750 DATA 144,5,169,8,76,144,
    128,201,4,144,3,76,219,133,3
    2,158,1644
F1  760 DATA 183,224,40,176,97,1
    42,117,148,32,249,131,224,25
    ,176,87,142,2193
E0  770 DATA 118,148,32,249,131,
    224,8,144,77,224,41,176,73,1
    42,119,148,2054
10  780 DATA 32,249,131,224,3,14
    4,63,224,26,176,59,142,120,1
    48,32,240,2013
2A  790 DATA 131,201,36,176,49,1
    41,138,148,165,34,141,136,14
    8,165,35,141,1985
A2  800 DATA 137,148,32,255,131,
    173,117,148,24,109,121,148,1
    09,119,148,201,2120
7A  810 DATA 41,176,19,173,118,1
    48,24,109,120,148,109,121,14
    8,201,26,176,1857
77  820 DATA 5,169,0,76,180,144,
    76,182,133,32,254,128,32,121
    ,0,76,1608
DC  830 DATA 113,168,173,104,148
    ,208,1,96,201,5,144,1,96,169
    ,0,76,1703
97  840 DATA 190,144,169,1,76,14
    4,128,169,2,76,144,128,174,1
    04,148,224,2021
A9  850 DATA 5,208,5,169,7,76,14
    4,128,224,6,208,5,169,6,76,1
    44,1580
E6  860 DATA 128,174,167,2,240,1
    4,224,9,176,221,32,60,147,14
    4,5,169,1912
5C  870 DATA 4,76,144,128,96,173
    ,104,148,201,6,240,1,96,32,4
    8,143,1640
4D  880 DATA 174,105,148,189,0,2
    04,201,32,240,10,41,127,157,
    0,204,232,2064
AC  890 DATA 224,40,144,239,169,
    1,76,190,144,173,104,148,201
    ,5,208,5,2071
15  900 DATA 169,6,76,144,128,20
    1,6,208,5,169,7,76,144,128,3
    2,158,1657
2A  910 DATA 183,224,6,144,81,22
    4,41,176,77,142,119,148,32,2
    49,131,224,2201
F6  920 DATA 3,144,67,224,26,176
    ,63,142,120,148,32,255,131,1
    73,119,148,1971
88  930 DATA 24,109,121,148,201,
    41,176,46,74,141,12,3,56,169
    ,20,237,1578
25  940 DATA 12,3,144,34,141,117
    ,148,173,120,148,24,109,121,
    148,201,25,1668
A6  950 DATA 176,20,74,141,12,3,
    56,169,12,237,12,3,144,8,141
    ,118,1326
50  960 DATA 148,169,1,76,180,14
    4,169,0,76,144,128,173,104,1
    48,201,5,1866
D4  970 DATA 240,1,96,169,1,76,1
    90,144,32,70,132,144,3,76,24
    2,132,1748
DA  980 DATA 201,5,208,3,76,60,1
    34,201,4,144,5,169,7,76,144,
    128,1565
EF  990 DATA 32,230,133,76,74,14
    5,32,48,143,32,158,183,224,4
    0,176,41,1767
7C  1000 DATA 142,117,148,32,249
    ,131,224,25,176,31,24,138,24
    ,109,108,148,1826
DF  1010 DATA 109,109,148,201,26
    ,176,18,142,118,148,173,117,
    148,24,109,107,1873
E3  1020 DATA 148,109,109,148,20
    1,41,176,1,96,76,182,133,32,
    70,132,144,1798
95  1030 DATA 3,76,242,132,201,5
    ,240,20,201,2,176,1,96,76,19
    6,145,1812
F1  1040 DATA 32,70,132,144,3,76
    ,242,132,201,5,208,5,169,3,7
    6,144,1642
CF  1050 DATA 128,32,230,133,76,
    72,145,32,155,183,201,41,240
    ,3,76,8,1755
60  1060 DATA 175,142,102,138,32
    ,247,174,174,102,138,224,2,1
    76,26,189,100,2141
54  1070 DATA 148,76,218,131,201
    ,238,208,21,32,115,0,201,18,
    240,3,76,1926
37  1080 DATA 8,175,32,115,0,76,
    37,133,169,2,76,144,128,32,1
    58,183,1468
1E  1090 DATA 224,9,176,244,142,
    167,2,32,121,0,201,145,208,6
    ,32,115,1824
E2  1100 DATA 0,76,252,132,174,1
    67,2,240,223,32,249,131,142,
    168,2,224,2214
C1  1110 DATA 39,176,213,32,249,
    131,224,0,240,206,224,21,176
    ,202,142,174,2449
4F  1120 DATA 2,32,249,131,224,2
    ,176,192,142,169,2,224,1,208
    ,8,173,1935
A0  1130 DATA 174,2,10,201,21,17
    6,177,32,240,131,201,0,240,1
    70,141,170,2086
62  1140 DATA 2,165,34,141,171,2
    ,165,35,141,172,2,173,134,2,
    141,173,1653
36  1150 DATA 2,141,110,148,141,
    111,148,169,0,141,121,148,32
    ,121,0,201,1734
D4  1160 DATA 44,208,9,32,202,13
    1,142,173,2,32,255,131,174,1
    67,2,202,1906
DE  1170 DATA 173,174,2,157,203,
    148,173,168,2,157,147,148,17
    3,169,2,157,2153
CE  1180 DATA 139,148,173,170,2,
    157,195,148,173,173,2,157,15
    5,148,173,110,2223
21  1190 DATA 148,157,187,148,17
    3,111,148,157,179,148,173,12
    1,148,157,219,148,2522
E3  1200 DATA 138,10,170,173,171
    ,2,157,163,148,173,172,2,157
    ,164,148,96,2044
14  1210 DATA 162,40,142,105,148
    ,162,25,142,106,148,162,41,1
    42,107,148,174,1954
31  1220 DATA 104,148,240,30,32,
    48,143,173,107,148,141,105,1
    48,206,105,148,2026
60  1230 DATA 206,105,148,173,10
    8,148,141,106,148,206,106,14
    8,206,106,148,206,2409
58  1240 DATA 107,148,32,158,183
    ,142,167,2,236,105,148,144,3
    ,76,213,131,1995
44  1250 DATA 32,249,131,142,168
    ,2,236,106,148,176,242,162,1
    ,32,121,0,1948
23  1260 DATA 201,44,208,3,32,24
    9,131,142,169,2,138,24,109,1
    67,2,205,1826
9C  1270 DATA 107,148,176,217,17
    4,104,148,240,48,56,32,19,14
    9,142,105,148,2013
00  1280 DATA 140,106,148,24,174
    ,167,2,172,168,2,32,19,149,1
    72,102,148,1725
C5  1290 DATA 162,0,177,251,73,1
    28,145,251,200,232,236,169,2
    ,144,243,24,2437
34  1300 DATA 174,105,148,172,10
    6,148,76,19,149,56,32,240,25
    5,142,105,148,2075
D0  1310 DATA 140,106,148,162,0,
    164,211,174,168,2,172,167,2,
    24,32,240,1912
BA  1320 DATA 255,162,0,164,211,
    177,209,73,128,145,209,200,2
    32,236,169,2,2572
2B  1330 DATA 144,243,24,174,105
    ,148,172,106,148,76,240,255,
    240,41,32,158,2306
4F  1340 DATA 173,32,163,182,133
    ,2,169,8,133,186,32,177,255,
    169,111,133,2058
5D  1350 DATA 185,32,147,255,160
    ,0,166,2,240,10,177,34,32,16
    8,255,200,2063
5E  1360 DATA 198,2,16,242,76,17
    4,255,169,13,32,210,255,32,2
    04,255,169,2302
D7  1370 DATA 8,133,186,32,180,2
    55,169,15,133,185,32,150,255
    ,32,165,255,2185
1D  1380 DATA 32,210,255,201,13,
    208,246,76,171,255,169,36,13
    3,2,162,2,2171
D2  1390 DATA 134,187,202,134,18
    3,202,134,188,169,8,133,186,
    169,96,133,185,2443
EC  1400 DATA 32,213,243,165,186
    ,32,55,242,144,3,76,249,224,
    162,6,165,2197
9B  1410 DATA 98,133,99,32,18,22
    5,133,98,165,144,208,41,202,
    208,240,169,2213
65  1420 DATA 39,32,12,225,32,20
    9,189,169,32,32,12,225,32,18
    ,225,170,1653
D8  1430 DATA 240,5,32,12,225,14
    4,245,169,13,32,12,225,32,22
    5,255,240,2106
59  1440 DATA 4,162,4,208,202,32
    ,204,255,76,66,246,169,1,168
    ,145,43,1985
70  1450 DATA 32,51,165,165,34,1
    05,2,133,45,165,35,105,0,133
    ,46,76,1292
73  1460 DATA 96,166,32,70,132,1
    44,6,76,242,132,32,21,151,32
    ,121,0,1453
4C  1470 DATA 240,40,240,41,201,
    163,240,52,201,166,24,240,47
    ,201,44,240,2380
14  1480 DATA 29,201,59,240,67,3
    2,158,173,36,13,48,222,32,22
    1,189,32,1752
AC  1490 DATA 135,180,32,21,151,
    32,219,150,208,211,76,120,15
    0,96,56,173,2010
64  1500 DATA 102,148,233,10,176
    ,252,73,255,105,1,208,17,8,3
    2,155,183,1958
D5  1510 DATA 201,41,208,32,40,1
    44,7,138,237,102,148,144,11,
    170,232,202,2057
28  1520 DATA 240,6,32,62,137,76
    ,47,137,32,115,0,76,226,136,
    142,132,1596
A2  1530 DATA 148,76,219,150,76,
    8,175,32,158,183,224,3,144,3
    ,76,213,1888
F5  1540 DATA 131,142,110,148,32
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    ,253,174,32,205,131,172,110,
    148,192,2,240,2222
4B  1550 DATA 5,138,153,32,208,9
    6,142,134,2,96,32,234,131,16
    5,20,5,1593
45  1560 DATA 21,208,6,32,228,25
    5,240,251,96,162,0,160,0,202
    ,208,253,2322
7E  1570 DATA 136,208,250,165,20
    ,240,4,198,20,208,242,165,21
    ,240,4,198,2319
D6  1580 DATA 21,208,234,96,169,
    147,133,9,32,70,132,165,9,17
    6,3,76,1680
2D  1590 DATA 239,149,76,210,255
    ,32,166,179,32,158,183,76,20
    4,146,32,121,2258
8E  1600 DATA 0,201,238,208,18,3
    2,115,0,201,18,208,11,173,21
    ,208,41,1693
A3  1610 DATA 254,141,21,208,76,
    115,0,201,145,208,11,173,21,
    208,9,1,1792
3F  1620 DATA 141,21,208,76,115,
    0,32,158,183,142,248,207,32,
    253,174,32,2022
DA  1630 DATA 205,131,142,39,208
    ,32,242,137,142,98,148,32,24
    2,137,142,99,2176
A9  1640 DATA 148,96,32,121,0,20
    1,44,208,8,32,249,131,224,9,
    176,4,1683
49  1650 DATA 44,162,2,96,76,213
    ,131,32,155,183,201,41,240,3
    ,76,8,1663
B8  1660 DATA 175,224,6,144,3,76
    ,213,131,142,129,148,32,247,
    174,173,104,2121
73  1670 DATA 148,208,11,174,129
    ,148,208,36,169,0,168,76,218
    ,131,32,48,1904
AC  1680 DATA 143,174,129,148,18
    9,104,148,160,0,76,218,131,2
    01,40,240,39,2140
93  1690 DATA 160,0,173,0,220,41
    ,15,73,15,76,218,131,162,0,1
    34,12,1430
41  1700 DATA 134,13,162,129,134
    ,97,202,134,98,169,0,133,99,
    133,100,133,1870
E8  1710 DATA 101,169,255,133,10
    2,96,1,32,250,174,169,0,141,
    102,138,32,1895
B5  1720 DATA 121,0,201,35,208,6
    ,238,102,138,32,115,0,32,158
    ,183,224,1793
ED  1730 DATA 5,144,3,76,213,131
    ,142,131,148,32,247,174,174,
    131,148,173,2072
93  1740 DATA 102,138,240,48,224
    ,2,176,235,173,104,148,240,3
    9,142,102,138,2251
3D  1750 DATA 32,48,143,174,102,
    138,254,105,148,189,107,148,
    56,233,2,157,2036
04  1760 DATA 107,148,189,112,14
    8,48,149,56,253,105,148,144,
    143,221,107,148,2226
9B  1770 DATA 176,138,144,25,224
    ,2,176,7,189,112,148,48,133,
    16,14,224,1776
D2  1780 DATA 4,176,7,202,202,18
    9,98,148,16,3,173,39,208,160
    ,0,76,1701
0D  1790 DATA 218,131,32,158,183
    ,134,201,224,40,176,42,32,24
    9,131,134,202,2287
05  1800 DATA 224,25,176,33,32,7
    0,132,176,20,165,201,170,205
    ,123,148,176,2076
38  1810 DATA 20,165,202,168,205
    ,124,148,176,12,24,76,19,149
    ,166,202,164,2020
C3  1820 DATA 201,24,76,240,255,
    76,213,131,76,213,131,32,155
    ,183,201,44,2251
DF  1830 DATA 240,3,76,8,175,134
    ,201,224,40,176,237,32,249,1
    31,134,202,2262
52  1840 DATA 224,25,176,228,32,
    247,174,32,70,132,176,51,165
    ,201,170,205,2308
47  1850 DATA 123,148,176,212,16
    5,202,168,205,124,148,176,20
    4,173,102,148,133,2607
10  1860 DATA 201,173,103,148,13
    3,202,32,19,149,172,102,148,
    177,251,133,190,2333
CE  1870 DATA 177,253,133,183,16
    6,201,164,202,24,32,19,149,7
    6,145,139,56,2119
8E  1880 DATA 32,240,255,142,12,
    3,140,13,3,166,202,164,201,2
    4,32,240,1869
7F  1890 DATA 255,164,211,177,20
    9,133,190,174,12,3,172,13,3,
    24,32,240,2012
6A  1900 DATA 255,165,190,160,0,
    76,218,131,173,114,148,160,0
    ,76,218,131,2215
72  1910 DATA 32,155,183,201,41,
    240,3,76,8,175,224,2,176,26,
    160,0,1702
1E  1920 DATA 189,134,148,32,218
    ,131,76,247,174,0,32,166,179
    ,32,158,183,2099
DC  1930 DATA 224,0,240,4,224,3,
    144,3,76,213,131,76,84,151,3
    2,250,1855
84  1940 DATA 174,32,158,173,32,
    166,182,133,165,166,34,134,1
    95,166,35,134,2079
D1  1950 DATA 196,32,249,131,138
    ,166,165,240,10,160,0,209,19
    5,240,13,200,2344
EB  1960 DATA 202,208,248,138,16
    0,0,32,218,131,76,247,174,20
    0,152,208,244,2638
FA  1970 DATA 32,158,183,134,193
    ,162,0,134,194,162,6,6,193,3
    8,194,202,1991
0B  1980 DATA 208,249,165,193,24
    ,105,97,133,193,165,194,105,
    155,133,194,32,2345
EE  1990 DATA 249,131,134,195,16
    2,0,134,196,162,6,6,195,38,1
    96,202,208,2214
F1  2000 DATA 249,165,196,24,105
    ,192,133,196,160,0,177,193,1
    45,195,200,192,2522
3A  2010 DATA 63,144,247,96,32,1
    58,173,32,121,0,201,167,208,
    3,32,115.1792
69  2020 DATA 0,165,97,208,5,32,
    9,169,240,6,32,121,0,76,105,
    130,1395
A0  2030 DATA 76,251,168,32,155,
    183,201,41,240,3,76,8,175,32
    ,115,0,1756
33  2040 DATA 224,2,144,3,76,213
    ,131,189,102,148,160,0,76,21
    8,131,216,2033
97  2050 DATA 132,147,137,225,13
    8,70,137,173,137,186,136,99,
    134,72,133,186,2242
39  2060 DATA 133,90,132,225,132
    ,27,134,199,133,47,134,164,1
    37,209,136,185,2217
29  2070 DATA 139,87,132,11,136,
    89,136,105,137,63,135,255,13
    9,6,138,59,1767
B6  2080 DATA 138,159,139,151,13
    9,26,139,205,139,98,140,70,1
    34,67,140,155,2039
FF  2090 DATA 129,173,129,191,12
    9,204,129,216,129,234,129,23
    5,129,250,129,12,2547
85  2100 DATA 130,0,0,0,0,0,0,0,
    0,0,0,165,1,41,252,120,709
49  2110 DATA 133,1,96,165,1,9,3
    ,133,1,88,96,165,14,24,101,2
    ,1032
70  2120 DATA 133,14,144,2,230,1
    5,24,165,2,101,16,133,16,144
    ,2,230,1371
07  2130 DATA 17,165,2,24,101,6,
    133,6,144,2,230,7,24,165,8,1
    01,1135
87  2140 DATA 2,133,8,144,2,230,
    9,24,165,10,101,2,133,10,144
    ,2,1119
74  2150 DATA 230,11,165,12,24,1
    01,2,133,12,144,2,230,13,96,
    169,0,1344
60  2160 DATA 133,10,133,12,169,
    204,133,11,169,216,133,13,16
    9,40,133,2,1680
A0  2170 DATA 174,118,148,240,6,
    32,23,141,202,208,250,173,11
    7,148,133,2,2115
2F  2180 DATA 32,23,141,96,32,46
    ,141,169,0,133,6,133,8,174,1
    04,148,1386
BA  2190 DATA 224,5,176,22,174,1
    04,148,202,138,10,10,72,24,1
    05,160,133,1707
12  2200 DATA 7,104,24,105,176,1
    33,9,76,130,141,169,240,133,
    7,169,244,1867
0C  2210 DATA 133,9,76,183,141,3
    2,48,143,174,107,148,202,202
    ,142,123,148,2011
AC  2220 DATA 174,108,148,202,20
    2,142,124,148,165,10,24,105,
    41,141,125,148,2007
C3  2230 DATA 165,11,105,0,141,1
    26,148,165,12,24,105,41,141,
    127,148,165,1624
F9  2240 DATA 13,105,0,141,128,1
    48,96,174,104,148,202,138,10
    ,10,10,10,1437
2E  2250 DATA 168,162,0,173,121,
    148,74,106,13,117,148,141,11
    7,148,189,117,1942
EA  2260 DATA 148,153,128,158,20
    0,232,224,4,144,244,162,0,18
    1,6,153,128,2265
D9  2270 DATA 158,232,200,224,8,
    144,245,96,160,0,177,12,153,
    60,3,200,2072
6D  2280 DATA 204,119,148,144,24
    5,177,12,153,60,3,32,219,140
    ,160,0,177,1993
04  2290 DATA 10,145,6,169,32,14
    5,10,185,60,3,145,8,200,204,
    119,148,1589
5E  2300 DATA 144,237,177,10,145
    ,6,185,60,3,145,8,76,227,140
    ,32,84,1679
03  2310 DATA 141,169,40,133,2,1
    74,120,148,32,232,141,160,0,
    173,210,140,2015
23  2320 DATA 145,10,173,110,148
    ,145,12,200,173,211,140,145,
    10,173,110,148,2053
22  2330 DATA 145,12,200,204,119
    ,148,144,240,173,212,140,136
    ,145,10,173,110,2311
CD  2340 DATA 148,145,12,202,32,
    1,141,32,232,141,160,0,173,2
    13,140,145,1917
AC  2350 DATA 10,173,110,148,145
    ,12,172,119,148,136,145,12,1
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    73,214,140,145,2002
80  2360 DATA 10,173,121,148,240
    ,10,200,169,160,145,10,173,1
    11,148,145,12,1975
49  2370 DATA 202,208,209,160,0,
    173,215,140,145,10,173,110,1
    48,145,12,200,2250
32  2380 DATA 173,216,140,145,10
    ,173,110,148,145,12,200,204,
    119,148,144,240,2327
AD  2390 DATA 136,173,217,140,14
    5,10,173,110,148,145,12,174,
    121,148,0,0,1852
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PROGRAM: WEOS LOADER 2

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21  10 BL=234:LN=50:SA=36512
5B  20 FOR L=0 TO BL:CX=0:FOR D=
    0 TO 15:READ A:CX=CX+A:POKE
    SA+L*16+D,A:NEXT D
A5  30 READ A:IF A><CX THENPRINT
    "ERROR IN LINE";LN+(L*10):ST
    OP
B6  40 NEXT L
E4  50 DATA 136,173,217,140,145,
    10,173,110,148,145,12,174,12
    1,148,240,25,2117
C1  60 DATA 230,2,32,1,141,32,23
    2,141,160,0,169,160,145,10,1
    73,111,1739
6E  70 DATA 148,145,12,200,204,1
    19,148,144,241,96,32,48,143,
    76,245,142,2143
45  80 DATA 32,219,140,160,0,177
    ,6,145,10,177,8,153,60,3,200
    ,204,1694
2A  90 DATA 107,148,144,241,32,2
    27,140,160,0,185,60,3,145,12
    ,200,204,2008
1F  100 DATA 107,148,144,245,96,
    169,40,133,2,174,108,148,32,
    208,142,202,2098
68  110 DATA 32,1,141,24,173,107
    ,148,109,109,148,141,107,148
    ,32,208,142,1770
F7  120 DATA 32,1,141,202,208,24
    7,173,109,148,240,20,162,0,2
    46,6,208,2143
FC  130 DATA 2,246,7,232,232,224
    ,8,144,244,206,107,148,76,20
    8,142,96,2322
0D  140 DATA 174,104,148,202,138
    ,10,10,10,10,168,162,0,185,1
    28,158,157,1764
1B  150 DATA 105,148,232,200,224
    ,4,144,244,162,0,185,128,158
    ,149,6,232,2321
37  160 DATA 200,224,8,144,245,1
    73,105,148,16,3,169,1,44,169
    ,0,141,1790
AF  170 DATA 109,148,173,105,148
    ,41,127,141,105,148,96,173,0
    ,220,74,176,1984
59  180 DATA 12,72,173,1,208,56,
    237,99,148,141,1,208,104,74,
    176,12,1722
F7  190 DATA 72,173,1,208,24,109
    ,99,148,141,1,208,104,74,176
    ,22,72,1632
B8  200 DATA 56,173,0,208,237,98
    ,148,141,0,208,176,8,173,16,
    208,73,1923
9A  210 DATA 1,141,16,208,104,74
    ,176,22,72,173,0,208,24,109,
    98,148,1574
BF  220 DATA 141,0,208,144,8,173
    ,16,208,73,1,141,16,208,104,
    74,176,1691
F5  230 DATA 3,169,1,44,169,0,14
    1,114,148,173,1,208,56,233,5
    0,144,1654
1C  240 DATA 65,74,74,74,141,113
    ,148,169,0,141,122,148,173,1
    6,208,74,1740
09  250 DATA 46,122,148,173,0,20
    8,56,233,24,176,7,72,78,122,
    148,104,1717
12  260 DATA 144,32,141,112,148,
    78,122,148,110,112,148,78,11
    2,148,78,112,1823
F7  270 DATA 148,173,112,148,201
    ,40,176,10,173,113,148,201,2
    5,176,3,76,1923
FB  280 DATA 49,234,169,255,141,
    112,148,141,113,148,76,49,23
    4,32,202,142,2245
32  290 DATA 173,116,148,141,104
    ,148,240,9,32,133,141,32,126
    ,150,32,59,1784
D4  300 DATA 148,96,32,202,142,2
    06,104,148,240,247,208,236,1
    73,104,148,240,2674
23  310 DATA 3,32,39,148,238,104
    ,148,162,97,32,85,148,32,30,
    142,173,1613
FC  320 DATA 136,148,133,34,173,
    137,148,133,35,173,138,148,2
    40,44,32,48,1900
D0  330 DATA 143,173,138,148,74,
    133,2,173,107,148,74,56,229,
    2,168,162,1930
A8  340 DATA 0,162,0,140,116,148
    ,138,168,177,34,41,63,9,128,
    172,116,1612
10  350 DATA 148,145,10,200,232,
    236,138,148,144,233,32,133,1
    41,32,126,150,2248
45  360 DATA 76,59,148,173,104,1
    48,141,116,148,240,6,32,48,1
    43,32,39,1653
17  370 DATA 148,169,5,141,104,1
    48,162,105,32,85,148,32,30,1
    42,32,133,1616
9D  380 DATA 141,76,126,150,201,
    0,208,3,76,60,144,76,147,144
    ,201,0,1753
22  390 DATA 208,3,76,50,144,76,
    29,144,169,40,133,2,174,108,
    148,32,1536
45  400 DATA 3,145,173,107,148,2
    4,109,109,148,141,107,148,32
    ,235,140,202,1971
49  410 DATA 32,3,145,32,235,140
    ,202,208,247,173,109,148,240
    ,20,162,0,2096
AC  420 DATA 246,6,208,2,246,7,2
    32,232,224,12,144,244,206,10
    7,148,76,2340
35  430 DATA 3,145,96,160,0,177,
    12,153,60,3,200,204,107,148,
    144,245,1857
78  440 DATA 32,219,140,160,0,18
    5,60,3,145,16,177,10,145,14,
    173,185,1664
F3  450 DATA 139,208,9,177,6,145
    ,10,177,8,153,60,3,200,204,1
    07,148,1754
59  460 DATA 144,227,32,227,140,
    173,185,139,208,200,160,0,18
    5,60,3,145,2228
77  470 DATA 12,200,204,107,148,
    144,245,96,24,36,56,169,0,42
    ,141,185,1809
C4  480 DATA 139,173,102,148,72,
    173,103,148,72,32,48,143,32,
    39,148,169,1741
89  490 DATA 0,133,14,133,16,169
    ,240,133,15,169,244,133,17,3
    2,200,144,1792
D0  500 DATA 173,185,139,240,3,2
    38,104,148,173,107,148,141,1
    19,148,173,108,2347
07  510 DATA 148,141,120,148,173
    ,109,148,141,121,148,32,84,1
    41,165,6,133,1958
96  520 DATA 14,165,7,133,15,165
    ,8,133,16,165,9,133,17,169,0
    ,133,1282
B1  530 DATA 6,133,8,169,240,133
    ,7,169,244,133,9,169,0,141,1
    85,139,1885
29  540 DATA 32,200,144,32,48,14
    3,32,59,148,32,133,141,104,1
    68,104,170,1690
90  550 DATA 24,76,19,149,32,48,
    143,169,0,133,14,133,16,169,
    240,133,1498
BB  560 DATA 15,169,244,133,17,1
    69,0,141,185,139,32,39,148,3
    2,200,144,1807
19  570 DATA 206,104,148,32,48,1
    43,169,0,133,14,133,16,169,2
    48,133,15,1711
FD  580 DATA 169,252,133,17,32,2
    00,144,174,104,148,202,138,1
    0,10,10,10,1753
7B  590 DATA 170,160,0,189,128,1
    58,153,167,2,200,232,192,16,
    144,244,238,2393
A7  600 DATA 104,148,32,48,143,1
    65,7,56,233,4,133,7,133,15,1
    65,9,1402
F5  610 DATA 56,233,4,133,9,133,
    17,206,104,148,162,0,189,105
    ,148,157,1804
4E  620 DATA 117,148,232,224,5,1
    44,245,32,183,141,165,6,133,
    14,165,8,1962
7B  630 DATA 133,16,169,240,133,
    7,169,244,133,9,169,0,133,6,
    133,8,1702
C7  640 DATA 32,200,144,238,104,
    148,174,104,148,202,138,10,1
    0,10,10,170,1842
33  650 DATA 173,172,2,24,105,4,
    141,172,2,173,174,2,24,105,4
    ,141,1418
E7  660 DATA 174,2,160,0,185,167
    ,2,157,128,158,232,200,192,1
    6,144,244,2161
F0  670 DATA 32,48,143,165,6,133
    ,14,165,7,133,15,165,8,133,1
    6,165,1348
B5  680 DATA 9,133,17,169,0,133,
    6,133,8,169,248,133,7,169,25
    2,133,1719
4A  690 DATA 9,32,200,144,32,133
    ,141,32,59,148,76,126,150,14
    2,185,139,1748
3C  700 DATA 138,10,170,189,163,
    148,29,164,148,208,2,56,96,1
    89,163,148,2021
FE  710 DATA 133,34,189,164,148,
    133,35,174,185,139,24,96,169
    ,0,141,104,1868
E8  720 DATA 148,169,147,32,210,
    255,160,40,132,34,160,204,13
    2,35,138,162,2158
B4  730 DATA 3,160,0,145,34,200,
    208,251,230,35,202,208,246,1
    45,34,160,2261
E0  740 DATA 191,145,34,136,208,
    251,162,0,142,211,148,32,173
    ,146,144,12,2135
B2  750 DATA 56,32,240,255,162,1
    ,160,0,24,76,240,255,189,195
    ,148,170,2203
50  760 DATA 160,0,177,34,240,15
    ,201,95,240,11,201,94,240,7,
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    32,210,1957
A6  770 DATA 255,200,202,208,237
    ,169,32,32,210,255,56,32,240
    ,255,174,185,2742
CB  780 DATA 139,152,232,157,211
    ,148,224,8,208,193,240,196,1
    42,100,148,202,2700
AB  790 DATA 32,173,146,144,1,96
    ,189,147,148,141,119,148,189
    ,203,148,141,2165
F9  800 DATA 120,148,133,97,189,
    139,148,133,98,240,3,14,120,
    148,189,179,2098
EB  810 DATA 148,141.111,148,189
    ,187,148,141,110,148,189,219
    ,148,141,121,148,2437
70  820 DATA 238,120,148,238,120
    ,148,189,211,148,141,117,148
    ,160,1,140,118,2385
78  830 DATA 148,24,109,119,148,
    109,121,148,201,40,144,2,56,
    96,172,117,1754
21  840 DATA 148,185,0,204,201,3
    2,240,10,9,128,153,0,204,200
    ,192,40,1946
69  850 DATA 144,239,173,104,148
    ,141,116,148,240,6,32,48,143
    ,32,39,148,1901
9F  860 DATA 169,6,141,104,148,1
    62,113,32,85,148,32,30,142,3
    2,48,143,1535
89  870 DATA 32,133,141,32,126,1
    50,174,100,148,202,173,134,2
    ,133,102,189,1971
A2  880 DATA 155,148,141,134,2,1
    38,10,170,189,163,148,133,34
    ,189,164,148,2066
78  890 DATA 133,35,169,255,133,
    99,160,0,177,34,201,95,240,3
    0,201,94,2056
F8  900 DATA 240,14,201,0,240,10
    ,166,99,48,3,32,239,149,200,
    208,232,2081
20  910 DATA 169,0,141,101,148,1
    65,102,141,134,2,24,96,230,9
    9,165,99,1816
87  920 DATA 197,97,240,236,166,
    98,240,1,10,132,100,168,162,
    0,24,32,1903
9D  930 DATA 19,149,164,100,76,2
    53,147,160,1,169,98,145,10,2
    00,145,10,1846
D9  940 DATA 172,107,148,136,136
    ,145,10,136,145,10,96,160,1,
    169,121,145,1837
5C  950 DATA 10,200,169,122,145,
    10,172,107,148,136,136,169,1
    24,145,10,136,1939
62  960 DATA 169,123,145,10,96,1
    60,1,138,153,209,140,200,232
    ,192,9,144,2121
1E  970 DATA 246,96,2,2,0,0,0,0,
    0,0,0,0,0,0,0,0,346
0A  980 DATA 255,255,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0,510
72  990 DATA 0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0
78  1000 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
66  1010 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
6C  1020 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
59  1030 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0
47  1040 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,C,0,0,0,0
A1  1050 DATA 0,0,0,147,19,18,14
    6,145,17,157,29,20,13,143,15
    0,126,1130
CB  1060 DATA 150,234,153,231,15
    3,191,150,177,150,205,150,21
    9,150,40,151,120,2624
42  1070 DATA 150,31,63,95,159,1
    91,223,96,64,96,64,0,32,255,
    224,192,1935
25  1080 DATA 160,96,64,144,7,17
    4,102,148,172,103,148,96,236
    ,123,148,144,2065
22  1090 DATA 2,162,0,204,124,14
    8,144,2,160,0,142,102,148,14
    0,103,148,1729
0C  1100 DATA 32,69,149,174,103,
    148,240,6,32,82,149,202,208,
    250,174,102,2120
C0  1110 DATA 148,172,103,148,96
    ,162,0,189,125,148,149,251,2
    32,224,4,144,2295
5A  1120 DATA 246,96,165,253,24,
    105,40,133,253,144,2,230,254
    ,165,251,24,2385
0F  1130 DATA 105,40,133,251,144
    ,2,230,252,96,165,253,56,233
    ,40,133,253,2386
BF  1140 DATA 176,2,198,254,165,
    251,56,233,40,133,251,176,2,
    198,252,96,2483
A3  1150 DATA 160,0,169,32,145,2
    51,173,134,2,145,253,200,204
    ,123,148,144,2283
99  1160 DATA 241,96,141,131,148
    ,142,132,148,140,133,148,96,
    173,131,148,174,2322
29  1170 DATA 132,148,172,133,14
    8,96,32,69,149,32,82,149,162
    ,1,32,201,1738
4D  1180 DATA 149,32,105,149,32,
    220,149,32,82,149,32,82,149,
    232,236,124,1954
FA  1190 DATA 148,144,235,32,105
    ,149,76,128,149,160,0,177,25
    1,153,0,158,2065
0E  1200 DATA 177,253,153,40,158
    ,200,204,123,148,144,240,96,
    160,0,185,0,2281
64  1210 DATA 158,145,251,185,40
    ,158,145,253,200,204,123,148
    ,144,240,96,32,2522
BD  1220 DATA 146,149,201,0,240,
    248,201,255,208,4,169,94,208
    ,28,41,127,2319
D1  1230 DATA 201,32,144,50,162,
    5,173,131,148,221,13,149,144
    ,3,202,16,1794
BA  1240 DATA 245,189,1,149,45,1
    31,148,29,7,149,172,102,148,
    13,115,148,1791
9E  1250 DATA 145,251,173,134,2,
    145,253,200,204,123,148,176,
    6,140,102,148,2350
4D  1260 DATA 76,156,149,76,91,1
    50,173,131,148,162,9,221,227
    ,148,240,9,2166
58  1270 DATA 202,16,248,32,210,
    255,76,156,149,138,10,170,18
    9,237,148,141,2377
6D  1280 DATA 129,148,189,238,14
    8,141,130,148,108,129,148,16
    9,0,141,102,148,2216
E2  1290 DATA 174,103,148,232,23
    6,124,148,176,9,32,82,149,23
    8,103,148,76,2178
3D  1300 DATA 156,149,32,166,149
    ,76,156,149,32,91,150,76,156
    ,149,32,69,1788
1A  1310 DATA 149,169,0,141,102,
    148,141,103,148,141,115,148,
    76,156,149,32,1918
38  1320 DATA 69,149,162,0,32,12
    8,149,32,82,149,232,236,124,
    148,144,244,2080
EE  1330 DATA 32,69,149,169,0,14
    1,102,148,141,103,148,141,11
    5,148,76,156,1838
F8  1340 DATA 149,173,102,148,72
    ,32,91,150,104,141,102,148,7
    6,156,149,173,1966
22  1350 DATA 102,148,72,32,234,
    150,104,141,102,148,76,156,1
    49,173,102,148,2037
68  1360 DATA 240,3,206,102,148,
    76,156,149,76,120,150,174,10
    2,148,232,236,2318
D4  1370 DATA 123,148,176,244,23
    8,102,148,76,156,149,169,0,1
    41,102,148,173,2293
E1  1380 DATA 103,148,240,8,32,1
    05,149,206,103,148,24,96,56,
    96,133,195,1842
AD  1390 DATA 132,196,160,0,177,
    195,240,12,32,239,149,230,19
    5,208,245,230,2640
60  1400 DATA 196,76,4,151,96,32
    ,166,182,160,0,170,232,202,2
    40,8,177,2092
91  1410 DATA 34,32,239,149,200,
    208,245,96,172,102,148,169,3
    2,145,251,173,2395
06  1420 DATA 134,2,145,253,136,
    48,6,140,102,148,76,156,149,
    32,234,150,1911
D0  1430 DATA 176,10,174,123,148
    ,202,142,102,148,76,156,149,
    169,0,141,102,2018
54  1440 DATA 148,76,156,149,142
    ,131,148,169,0,133,193,169,2
    04,133,194,169,2314
25  1450 DATA 0,141,134;148,141,
    135,148,141,100,148,141,101,
    148,173,114,148,2061
12  1460 DATA 208,1,96,173,112,1
    48,16,1,96,141,132,148,174,1
    13,148,16,1723
4F  1470 DATA 1,96,142,133,148,2
    32,202,240,14,24,165,193,105
    ,40,133,193,2061
AD  1480 DATA 144,2,230,194,202,
    208,242,172,132,148,1/7,193,
    201,121,240,46,2652
DB  1490 DATA 201,122,240,41,201
    ,123,240,49,201,124,240,44,1
    62,0,221,233,2442
0A  1500 DATA 152,240,8,232,224,
    5,144,246,76,240,151,232,232
    ,232,142,135,2691
7E  1510 DATA 148,169,1,141,134,
    148,177,193,73,128,145,193,9
    6,136,169,1,2052
97  1520 DATA 141,135,148,141,13
    4,148,208,10,136,162,1,142,1
    34,148,232,142,2162
68  1530 DATA 135,148,177,193,9,
    128,145,193,200,177,193,9,12
    8,145,193,96,2269
75  1540 DATA 173,131,148,201,1,
    208,1,96,174,133,148,240,1,9
    6,32,238,2021
30  1550 DATA 152,144,1,96,142,1
    00,148,142,135,148,162,2,142
    ,134,148,174,1970
52  1560 DATA 100,148,32,60,147,
    32,48,143,238,105,148,238,10
    6,148,206,107,2006
B7  1570 DATA 148,206,108,148,20
    6,108,148,32,80,153,173,114,
    148,240,248,174,2434
53  1580 DATA 105,148,48,243,142
    ,132,148,173,113,148,48,235,
    141,133,148,208,2313
2F  1590 DATA 3,76,25,153,205,10
    6,148,144,222,236,105,148,14
    4,217,237,106,2275
1C  1600 DATA 148,205,108,148,17
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    6,209,138,56,237,105,148,205
    ,107,148,176,199,2513
A6  1610 DATA 172,133,148,136,13
    6,174,100,148,202,189,139,14
    8,240,5,152,74,2296
49  1620 DATA 176,181,168,200,20
    4,101,148,208,6,32,80,153,76
    ,37,133,132,2035
74  1630 DATA 98,32,143,152,164,
    98,140,101,148,32,143,152,76
    ,39,152,174,1844
D5  1640 DATA 101,148,208,1,96,1
    74,100,148,202,189,155,148,1
    33,99,169,0,2071
A0  1650 DATA 133,193,133,194,17
    2,101,148,136,189,139,148,24
    0,3,152,10,168,2259
EE  1660 DATA 200,200,152,170,16
    5,193,24,105,40,133,193,144,
    2,230,194,202,2347
2F  1670 DATA 208,242,165,194,24
    ,105,204,133,21,165,194,105,
    216,133,194,165,2468
8C  1680 DATA 193,133,20,172,105
    ,148,174,107,148,202,177,20,
    73,128,145,20,1965
F4  1690 DATA 165,99,145,193,200
    ,202,208,242,96,93,30,92,91,
    31,172,132,2191
43  1700 DATA 148,185,0,204,201,
    32,208,2,56,96,162,1,160,0,2
    04,132,1791
A0  1710 DATA 148,240,20,185,0,2
    04,201,32,240,7,200,192,40,1
    44,239,56,2148
F6  1720 DATA 96,232,224,9,144,2
    44,96,24,96,32,238,152,144,3
    ,76,39,1849
85  1730 DATA 152,236,100,148,20
    8,18,32,37,133,162,0,142,100
    ,148,142,101,1859
B0  1740 DATA 148,142,134,148,14
    2,135,148,96,134,98,32,37,13
    3,162,0,142,1831
25  1750 DATA 101,148,166,98,142
    ,100,148,142,135,148,32,60,1
    47,76,21,152,1816
C7  1760 DATA 162,30,160,0,234,2
    34,234,136,208,250,202,208,2
    47,96,173,14,2588
2D  1770 DATA 220,41,254,141,14,
    220,165,1,41,251,133,1,120,1
    65,1,41,1809
C1  1780 DATA 253,133,1,169,0,13
    3,20,133,34,169,208,133,21,1
    69,224,133,1933
8C  1790 DATA 35,162,16,160,0,17
    7,20,145,34,200,208,249,230,
    35,230,21,1922
A9  1800 DATA 202,208,242,160,0,
    185,242,153,153,216,226,153,
    216,234,73,255,2918
ED  1810 DATA 153,216,230,153,21
    6,238,200,208,236,160,0,185,
    242,154,153,216,2960
87  1820 DATA 227,153,216,235,73
    ,255,153,216,231,153,216,239
    ,200,192,17,144,2920
B0  1830 DATA 234,165,1,9,6,133,
    1,88,173,14,220,9,1,141,14,2
    20,1429
3D  1840 DATA 173,0,221,41,252,1
    41,0,221,169,204,141,136,2,1
    69,57,141,2068
5A  1850 DATA 24,208,169,147,32,
    210,255,169,0,44,169,128,141
    ,115,148,76,2035
3A  1860 DATA 156,149,0,24,24,24
    ,24,126,44,24,0,4,6,255,255,
    6,1121
58  1870 DATA 4,0,255,129,129,15
    3,153,129,129,255,204,51,204
    ,51,204,51,2101
14  1880 DATA 204,51,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,0,255
20  1890 DATA 0,0,255,128,255,12
    8,255,128,255,128,255,0,255,
    0,255,0,2297
43  1900 DATA 255,0,255,1,255,1,
    255,1,255,1,128,128,128,128,
    128,128,2047
8E  1910 DATA 128,128,1,1,1,1,1,
    1,1,1,128,128,128,128,128,12
    8,1032
19  1920 DATA 128,255,0,0,0,0,0,
    0,0,255,1,1,1,1,1,1,644
CC  1930 DATA 1,255,0,127,64,95,
    95,88,88,88,0,255,0,255,255,
    0,1666
9B  1940 DATA 0,0,0,254,2,250,25
    0,26,26,26,88,88,88,88,88,88
    ,1362
69  1950 DATA 88,88,26,26,26,26,
    26,26,26,26,88,88,88,95,95,6
    4,902
06  1960 DATA 127,0,0,0,0,255,25
    5,0,255,0,26,26,26,250,250,2
    ,1472
63  1970 DATA 254,0,255,255,192,
    192,192,192,192,192,255,255,
    0,0,0,0,2426
57  1980 DATA 0,0,255,255,3,3,3,
    3,3,3,192,192,192,192,192,19
    2,1680
F2  1990 DATA 192,192,3,3,3,3,3,
    3,3,3,192,192,192,192,192,19
    2,1560
2E  2000 DATA 255,255,0,0,0,0,0,
    0,255,255,3,3,3,3,3,3,1038
CF  2010 DATA 255,255,255,255,19
    2,207,207,192,255,255,255,25
    5,3,243,243,3,3330
02  2020 DATA 255,255,255,128,15
    9,145,159,129,128,255,255,1,
    1,249,137,249,2760
CB  2030 DATA 1,255,87,69,79,66,
    65,83,73,67,32,49,46,48,13,8
    7,1120
5E  2040 DATA 73,78,68,79,87,32,
    69,78,86,73,82,79,78,77,69,7
    8,1186
55  2050 DATA 84,32,79,80,69,82,
    65,84,73,78,71,32,83,89,83,8
    4,1168
9F  2060 DATA 69,77,32,52,46,48,
    13,40,67,41,32,49,57,56,55,3
    2,766
1A  2070 DATA 82,79,78,89,32,86,
    65,78,32,72,79,86,69,13,40,6
    7,1047
C1  2080 DATA 41,32,49,57,56,55,
    32,65,83,80,32,76,84,68,46,1
    3,869
BA  2090 DATA 0,128,0,0,192,0,0,
    224,0,0,240,0,0,248,0,0,1032
54  2100 DATA 252,0,0,248,0,0,24
    0,0,0,240,0,0,208,0,0,136,13
    24
CA  2110 DATA 0,0,8,0,0,4,0,0,4,
    0,0,0,0,0,0,0,16
83  2120 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
24  2130 DATA 0,255,255,255,255,
    255,255,0,0,3,0,0,3,0,0,3,15
    39
2A  2140 DATA 0,0,3,0,0,3,0,0,3,
    0,0,3,0,0,3,0,15
34  2150 DATA 0,3,0,0,3,0,0,3,0,
    0,3,0,0,3,0,0,15
22  2160 DATA 3,0,0,3,0,0,3,0,0,
    3,0,0,3,0,0,3,18
08  2170 DATA 0,0,0,3,0,0,3,0,0,
    3,0,0,3,0,0,3,15
12  2180 DATA 0,0,3,0,0,3,0,0,3,
    0,0,3,0,0,3,0,15
FC  2190 DATA 0,3,0,0,3,0,0,3,0,
    0,3,0,0,3,0,0,15
7D  2200 DATA 3,0,0,3,0,0,3,0,0,
    3,255,255,255,255,255,255,15
    42
5A  2210 DATA 0,0,162,0,134,2,13
    2,195,133,196,32,253,154,32,
    51,156,1632
07  2220 DATA 76,122,225,32,185,
    155,165,171,201,2,240,8,201,
    1,208,243,2235
19  2230 DATA 0,255,0,255,0,255,
    0,66,64,64,0,255,0,255,0,255
    ,1724
86  2240 DATA 0,255,0,255,0,255,
    0,255,0,255,0,255,0,255,0,0,
    1785
F7  2250 DATA 0,255,0,255,0,255,
    0,255,0,255,0,255,0,255,0,25
    5,2040
A1  2260 DATA 0,255,0,255,0,255,
    0,255,0,255,0,255,0,157,255,
    157,2099
10  2270 DATA 136,255,12,255,255
    ,0,0,255,255,0,255,0,255,1,1
    27,0,2061
CC  2280 DATA 255,0,255,0,255,0,
    255,254,255,0,255,0,255,0,25
    5,255,2549
9F  2290 DATA 255,0,255,0,255,0,
    255,0,255,0,255,0,255,0,255,
    0.2040
0C  2300 DATA 255,0,255,0,255,0,
    223,0,255,0,0,0,255,0,255,20
    5,1958
80  2310 DATA 255,0,255,0,255,0,
    255,189,189,16,255,0,255,0,2
    55,0,2179
C6  2320 DATA 255,0,255,0,255,0,
    255,0,255,0,255,0,255,0,255,
    120,2160
86  2330 DATA 255,0,255,0,255,0,
    255,0,255,0,255,0,255,0,255,
    0,2040
FB  2340 DATA 255,0,255,0,255,0,
    255,0,255,0,255,0,255,231,0,
    231,2247
E0  2350 DATA 247,0,243,0,0,255,
    255,0,0,255,0,255,0,254,128,
    255,2147
D3  2360 DATA 0,255,0,255,0,255,
    0,1,0,255,0,255,0,255,0,0,15
    31
6E  2370 DATA 0,255,0,255,0,255,
    0,255,0,255,0,255,0,255,0,25
    5,2040
B8  2380 DATA 0,255,0,255,0,255,
    32,255,0,255,255,255,0,255,0
    ,49,2121
8C  2390 DATA 0,0,0,0,0,0,0,0,0,
    0,0,0,0,0,0,0,0
F6  2400 REM ********************
    ***********
7E  2410 REM *  SAVE TO DISK IF.
     USING     *
A9  2420 REM *  TAPE CHANGE ,8,1
     IN SAVE   *
AD  2430 REM *  INSTRUCTION TO ,
    1,1        *
3E  2440 REM ********************
    ***********
2C  2450 PRINT"[CLR,DOWN4,RIGHT4
    ]PRESS A KEY TO SAVE"
54  2460 GETK$:IFK$=""THEN2460
7F  2470 POKE43,0:POKE44,128:POK
    E45,65:POKE46,157:SAVE "WEOB
    ASIC.CODE",8,1
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Ultra Function Keys

PROGRAM: UFK LOADER

```
FF  40 FL=100:LL=2390:IN=10:AD=49152
E4  50 FORA=0TO(LL-FL)/IN
4D  60 FORB=1TO16:READDT:POKEAD,DT:AD=AD+1:CH=CH+DT:NEXT
20  70 READCK:IFCK=CHTHENCH=0:PRINT"LINE";FL+A*IN;"IS OK":NEXT:GOTO90
F3  80 PRINT"[DOWN2]ERROR IN LINE";FL+A*IN:END
1A  90 FORI=52830TO53105:POKEI,0:NEXT
6A  95 PRINT"[DOWN2]EVERYTHING OK. THE DATA IS NOW IN MEMORY":END
B8  100 DATA76,19,194,76,236,197,76,37,195,76,79,197,76,150,197,76,1957
0C  110 DATA254,205,76,50,206,119,0,0,2,4,6,1,3,5,7,1,939
6C  120 DATA160,0,164,0,168,0,172,0,176,0,180,0,184,72,191,0,1467
30  130 DATA188,120,188,240,188,104,189,224,189,88,190,208,190,254,253,251,3064
4C  140 DATA247,239,223,191,127,83,89,83,52,57,49,53,53,13,0,19,1578
1C  150 DATA83,89,83,52,57,49,53,56,13,141,141,42,42,42,32,65,1040
4C  160 DATA66,79,82,84,69,68,32,42,42,42,141,0,85,70,75,32,1009
FD  170 DATA32,40,67,41,32,49,57,56,55,32,71,46,72,65,67,75,857
39  180 DATA87,79,82,84,72,32,78,79,87,32,79,80,69,82,65,84,1171
0D  190 DATA73,86,69,46,0,73,78,70,79,82,77,65,84,73,79,78,1112
74  200 DATA32,82,69,81,85,73,82,69,68,32,66,69,70,79,82,69,1108
E9  210 DATA32,80,82,79,67,69,69,68,73,78,71,0,147,80,82,69,1146
EA  220 DATA83,83,32,84,72,69,32,70,85,78,67,84,73,79,78,32,1101
78  230 DATA75,69,89,32,89,79,85,32,87,73,83,72,32,84,79,32,1092
14  240 DATA69,68,73,84,44,79,82,32,80,82,69,83,83,32,39,70,1069
45  250 DATA56,39,32,84,79,32,86,73,69,87,32,75,69,89,32,68,1002
D6  260 DATA69,83,67,82,73,80,84,73,79,78,83,46,0,147,80,82,1206
6B  270 DATA69,83,83,32,84,72,69,32,70,85,78,67,84,73,79,78,1138
AF  280 DATA32,75,69,89,32,89,79,85,32,87,65,78,84,32,84,72,1084
32  290 DATA69,13,68,69,83,67,82,73,80,84,73,79,78,32,79,70,1099
DB  300 DATA44,32,79,82,32,80,82,69,83,83,32,39,70,56,39,32,934
E8  310 DATA70,79,82,32,65,76,76,32,79,70,84,72,69,32,68,69,1055
AE  320 DATA83,67,82,73,80,84,73,79,78,83,32,73,78,32,83,69,1149
D3  330 DATA81,85,69,78,67,69,46,0,147,68,69,83,67,82,73,80,1164
F5  340 DATA84,73,79,78,32,70,79,82,32,70,0,46,13,91,13,13,855
3A  350 DATA13,157,93,0,13,13,68,79,32,89,79,85,32,87,65,78,983
FB  360 DATA84,32,84,79,32,69,68,73,84,32,84,72,69,32,68,69,1031
D0  370 DATA83,67,82,73,80,84,73,79,78,32,89,47,78,46,0,145,1136
77  380 DATA79,78,67,69,32,70,73,78,73,83,72,69,68,32,80,82,1105
F8  390 DATA69,83,83,32,82,69,84,85,82,78,32,84,79,32,67,79,1120
75  400 DATA78,84,73,78,85,69,46,32,0,147,32,68,79,32,89,79,1071
3A  410 DATA85,32,87,65,78,84,32,84,79,32,67,76,69,65,82,32,1049
9F  420 DATA84,72,69,32,77,69,77,79,82,89,32,40,89,47,78,41,1057
06  430 DATA46,32,0,169,0,141,19,207,120,169,55,141,20,3,169,194,1485
14  440 DATA141,21,3,160,9,185,69,192,153,72,191,136,16,247,32,106,1733
A1  450 DATA205,162,0,32,7,196,96,32,97,196,173,19,207,208,82,173,1885
0A  460 DATA107,207,208,10,165,197,205,106,207,240,64,206,107,207,173,141,2550
FF  470 DATA2,201,2,176,54,141,25,207,165,197,141,106,207,201,3,144,1972
7E  480 DATA42,201,7,176,38,201,4,144,3,56,233,4,10,24,109,25,1277
81  490 DATA207,141,26,207,238,107,207,10,168,185,31,192,133,251,185,32,2320
09  500 DATA192,133,252,238,19,207,169,0,141,137,2,32,91,196,76,49,1934
C5  510 DATA234,201,3,240,246,201,10,240,245,72,173,22,207,208,26,165,2493
4D  520 DATA197,201,63,208,20,104,169,1,141,19,207,169,89,133,251,169,2141
B1  530 DATA192,133,252,238,22,207,76,193,194,104,201,2,208,3,76,197,2298
CF  540 DATA195,165,198,240,3,76,139,194,160,0,177,251,240,27,201,255,2521
69  550 DATA208,6,32,150,197,76,225,194,201,254,240,29,141,119,2,230,2304
8D  560 DATA198,162,251,32,102,196,76,139,194,206,19,207,169,10,141,137,2239
73  570 DATA2,169,0,141,22,207,76,139,194,169,3,141,19,207,32,109,1630
32  580 DATA196,56,32,240,255,140,103,207,142,104,207,160,10,132,198,136,2318
D2  590 DATA185,79,192,153,119,2,136,16,247,165,212,141,105,207,169,0,2128
24  600 DATA133,212,76,139,194,169,10,141,137,2,32,227,196,160,1,162,1991
94  610 DATA1,24,32,240,255,162,1,32,7,196,162,251,32,102,196,160,1853
6A  620 DATA1,162,2,24,32,240,255,160,0,132,204,152,72,32,189,196,1853
EE  630 DATA170,104,168,138,201,13,240,38,201,20,240,84,201,141,240,46,2245
E1  640 DATA201,32,144,231,201,128,144,8,201,160,144,223,201,192,176,219,2605
2F  650 DATA192,37,240,215,153,65,207,32,70,196,200,76,75,195,169,0,2122
32  660 DATA153,65,207,160,37,185,65,207,153,27,207,136,16,247,120,230,2215
BC  670 DATA204,169,27,133,253,169,207,133,254,169,0,141,137,2,169,19,2186
59  680 DATA32,210,255,169,2,141,19,207,238,21,207,88,96,76,139,194,2094
7E  690 DATA192,1,144,151,136,32,70,196,169,32,141,118,4,169,93,141,1789
E4  700 DATA119,4,76,75,195,173,21,207,240,21,172,103,207,174,104,207,2098
D8  710 DATA24,32,240,255,173,105,207,133,212,206,21,207,32,142,196,165,2350
87  720 DATA198,240,11,201,1,240,198,169,1,133,198,76,139,194,160,0,2159
9A  730 DATA177,253,240,13,141,119,2,230,198,162,253,32,102,196,76,139,2333
39  740 DATA194,206,19,207,76,139,194,169,108,133,247,169,192,133,248,224,2658
5A  750 DATA0,240,33,142,20,207,32,32,196,174,20,207,202,76,15,196,1792
5E  760 DATA160,0,177,247,240,8,162,247,32,102,196,76,32,196,162,247,2284
1A  770 DATA32,102,196,96,160,0,177,247,240,11,32,70,196,200,208,246,2213
9A  780 DATA230,248,76,54,196,96,141,22,192,152,72,138,72,173,22,192,2076
7B  790 DATA32,210,255,104,170,104,168,173,22,192,96,173,21,192,133,1,2046
29  800 DATA96,169,54,133,1,96,246,0,208,2,246,1,96,160,159,185,1852
43  810 DATA0,4,153,82,191,169,32,153,0,4,32,175,196,136,192,255,1774
7C  820 DATA208,237,160,6,185,217,0,153,242,191,136,16,247,96,160,159,2413
81  830 DATA32,97,196,185,82,191
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    ,153,0,4,32,175,196,136,192,
    255,208,2134
4A  840 DATA242,160,6,185,242,19
    1,153,217,0,136,16,247,76,60
    ,197,185,2313
71  850 DATA0,216,190,115,206,15
    3,115,206,138,153,0,216,96,1
    65,197,201,2367
94  860 DATA63,208,26,32,142,195
    ,169,107,133,253,169,192,133
    ,254,169,89,2334
9F  870 DATA133,251,169,192,133,
    252,238,22,207,104,104,104,9
    6,32,228,255,2520
D3  880 DATA240,251,96,173,32,20
    8,141,112,206,173,33,208,141
    ,113,206,173,2506
05  890 DATA134,2,141,114,206,16
    9,1,141,32,208,141,33,208,16
    9,0,141,1840
6F  900 DATA134,2,169,112,141,0,
    4,169,110,141,39,4,169,109,1
    41,120,1564
CD  910 DATA4,169,125,141,159,4,
    169,93,141,40,4,141,79,4,141
    ,80,1494
2B  920 DATA4,141,119,4,160,37,1
    69,64,153,1,4,153,121,4,136,
    16,1286
E7  930 DATA247,160,7,169,0,153,
    0,216,136,16,250,96,173,112,
    206,141,2082
BF  940 DATA32,208,173,113,206,1
    41,33,208,173,114,206,141,13
    4,2,96,169,2149
4F  950 DATA107,133,251,169,192,
    133,252,169,1,141,19,207,169
    ,0,133,198,2274
15  960 DATA96,238,23,207,208,18
    ,238,24,207,173,24,207,201,1
    9,144,8,2035
A1  970 DATA169,0,141,24,207,238
    ,32,208,160,7,173,32,208,73,
    8,141,1821
7B  980 DATA32,208,185,61,192,14
    1,0,220,173,1,220,201,255,20
    8,6,136,2239
B7  990 DATA16,240,76,97,197,96,
    173,32,208,141,112,206,32,97
    ,197,173,2093
38  1000 DATA112,206,141,32,208,
    96,173,19,207,141,103,206,16
    9,3,141,19,1976
1C  1010 DATA207,32,123,200,173,
    137,2,141,105,206,169,10,141
    ,137,2,173,1958
77  1020 DATA32,208,141,112,206,
    173,33,208,141,113,206,173,1
    34,2,141,114,2137
D3  1030 DATA206,56,32,240,255,1
    42,104,207,140,103,207,32,19
    9,199,169,1,2292
28  1040 DATA141,32,208,141,33,2
    08,169,0,141,134,2,96,32,166
    ,197,32,1732
E0  1050 DATA47,198,32,8,200,24,
    174,104,207,172,103,207,32,2
    40,255,173,2176
1D  1060 DATA112,206,141,32,208,
    173,113,206,141,33,208,173,1
    14,206,141,134,2341
37  1070 DATA2,32,123,200,173,10
    5,206,141,137,2,173,103,206,
    141,19,207,1970
CB  1080 DATA169,3,141,106,207,1
    69,0,141,107,207,169,0,133,2
    07,96,162,2017
B4  1090 DATA2,32,7,196,32,83,20
    0,176,43,201,7,240,3,76,165,
    201,1664
76  1100 DATA162,3,32,7,196,32,8
    3,200,176,26,201,7,240,3,76,
    101,1545
CE  1110 DATA198,160,0,140,26,20
    7,152,72,32,101,198,104,176,
    6,168,200,1940
D6  1120 DATA192,7,208,239,96,16
    2,4,32,7,196,173,26,207,24,1
    05,49,1727
E5  1130 DATA32,210,255,162,5,32
    ,7,196,173,26,207,10,168,185
    ,47,192,1907
95  1140 DATA133,251,185,48,192,
    133,252,160,116,32,97,196,17
    7,251,153,41,2417
B8  1150 DATA4,136,16,248,32,91,
    196,162,6,32,7,196,32,143,20
    0,144,1645
8B  1160 DATA1,96,208,253,32,84,
    201,133,204,141,111,206,169,
    118,141,110,2208
0C  1170 DATA206,162,7,32,7,196,
    32,164,200,238,108,206,173,1
    08,206,201,2246
A2  1180 DATA40,208,8,169,0,141,
    108,206,238,109,206,238,109,
    206,32,50,2068
12  1190 DATA205,169,0,133,212,3
    2,93,201,144,3,76,189,199,20
    1,13,208,2078
8A  1200 DATA3,76,194,199,201,17
    ,208,23,172,101,206,192,78,1
    76,199,72,2117
36  1210 DATA169,40,32,247,200,1
    04,32,144,201,32,210,255,76,
    182,198,201,2323
D3  1220 DATA18,208,6,32,210,255
    ,76,182,198,201,19,208,9,32,
    144,201,1999
33  1230 DATA32,84,201,76,182,19
    8,201,20,208,14,173,101,206,
    13,102,206,2017
CB  1240 DATA240,148,32,35,201,7
    6,182,198,201,29,208,6,32,14
    4,201,76,2009
00  1250 DATA165,199,201,145,208
    ,23,172,101,206,192,40,144,3
    9,72,169,40,2116
33  1260 DATA32,13,201,104,32,14
    4,201,32,210,255,76,182,198,
    201,146,208,2235
B6  1270 DATA6,32,210,255,76,182
    ,198,201,147,208,12,32,144,2
    01,32,117,2053
58  1280 DATA201,32,84,201,76,18
    2,198,201,148,208,14,32,106,
    201,176,74,2134
F8  1290 DATA32,144,201,32,61,20
    1,76,182,198,201,157,208,24,
    173,101,206,2197
EC  1300 DATA13,101,206,240,223,
    169,1,32,13,201,169,157,32,1
    44,201,32,1934
2E  1310 DATA210,255,76,182,198,
    201,32,144,203,201,128,144,8
    ,201,160,144,2487
BB  1320 DATA195,201,192,176,191
    ,32,106,201,176,16,32,210,25
    5,169,1,32,2185
72  1330 DATA247,200,169,2,133,2
    05,169,0,133,207,76,100,199,
    32,128,201,2201
5E  1340 DATA56,96,32,128,201,24
    ,96,160,0,185,0,4,153,0,224,
    185,1544
E2  1350 DATA0,5,153,0,225,185,0
    ,6,153,0,226,185,232,6,153,2
    32,1761
EA  1360 DATA226,185,0,216,153,0
    ,228,185,0,217,153,0,229,185
    ,0,218,2195
C8  1370 DATA153,0,230,185,232,2
    18,153,232,230,200,208,205,1
    60,25,185,217,2833
C8  1380 DATA0,153,0,232,136,16,
    247,96,160,0,120,169,53,133,
    1,185,1701
D3  1390 DATA0,224,153,0,4,185,0
    ,225,153,0,5,185,0,226,153,0
    ,1513
7D  1400 DATA6,185,232,226,153,2
    32,6,185,0,228,153,0,216,185
    ,0,229,2236
BF  1410 DATA153,0,217,185,0,230
    ,153,0,218,185,232,230,153,2
    32,218,200,2606
1E  1420 DATA208,205,160,25,185,
    0,232,153,217,0,136,16,247,1
    69,55,133,2141
3A  1430 DATA1,88,96,32,108,200,
    176,19,201,133,144,247,201,1
    41,176,243,2206
71  1440 DATA56,233,133,168,185,
    23,192,141,26,207,24,96,165,
    197,201,63,2110
E3  1450 DATA208,2,56,96,32,228,
    255,240,251,24,96,160,3,185,
    251,0,2087
16  1460 DATA72,185,97,206,153,2
    51,0,104,153,97,206,136,16,2
    39,96,32,2043
26  1470 DATA108,200,176,15,201,
    89,240,8,201,78,208,243,24,1
    69,1,96,2057
55  1480 DATA24,169,0,96,173,101
    ,206,141,91,206,173,102,206,
    141,92,206,2127
3B  1490 DATA169,40,141,95,206,1
    69,0,141,96,206,32,202,200,1
    73,91,206,2167
01  1500 DATA141,109,206,173,93,
    206,141,108,206,96,162,17,16
    9,0,168,240,2235
20  1510 DATA22,46,93,206,46,94,
    206,56,173,93,206,237,95,206
    ,168,173,2120
34  1520 DATA94,206,237,96,206,1
    44,6,140,93,206,141,94,206,4
    6,91,206,2212
BF  1530 DATA46,92,206,202,208,2
    19,96,141,104,206,173,101,20
    6,24,109,104,2237
FD  1540 DATA206,141,101,206,173
    ,102,206,105,0,141,102,206,9
    6,141,104,206,2236
3F  1550 DATA173,101,206,56,237,
    104,206,141,101,206,173,102,
    206,233,0,141,2386
72  1560 DATA102,206,96,169,1,32
    ,13,201,172,101,206,185,42,4
    ,153,41,1724
46  1570 DATA4,200,204,110,206,2
    08,244,169,32,141,158,4,96,1
    60,117,185,2238
A2  1580 DATA40,4,153,41,4,136,2
    04,101,206,208,244,169,32,15
    3,41,4,1740
99  1590 DATA141,158,4,96,169,0,
    141,101,206,141,102,206,96,3
    2,108,200,1901
E1  1600 DATA176,7,201,192,144,2
    ,233,96,24,96,172,101,206,19
    2,117,208,2167
39  1610 DATA2,56,96,24,96,160,1
    16,169,32,153,41,4,136,16,25
    0,96,1447
2C  1620 DATA230,204,32,144,201,
    160,116,185,41,4,145,251,136
    ,16,248,96,2209
E8  1630 DATA72,120,165,207,240,
    12,165,206,174,135,2,160,0,1
    32,207,32,2029
F5  1640 DATA19,234,88,104,96,16
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    9,147,32,210,255,169,10,141,
    19,207,169,2069
AD  1650 DATA15,141,32,208,32,97
    ,196,173,26,207,10,168,185,3
    1,192,133,1846
0E  1660 DATA251,141,106,206,185
    ,32,192,133,252,141,107,206,
    160,0,132,212,2456
92  1670 DATA177,251,208,8,169,4
    6,32,27,204,76,59,202,201,13
    ,208,8,1889
7E  1680 DATA169,60,32,27,204,76
    ,51,202,201,19,208,8,169,83,
    32,27,1568
58  1690 DATA204,76,51,202,201,2
    0,208,8,169,68,32,27,204,76,
    51,202,1799
87  1700 DATA201,141,208,8,169,9
    5,32,27,204,76,51,202,201,14
    7,208,8,1978
50  1710 DATA169,115,32,27,204,7
    6,51,202,201,254,208,8,169,6
    3,32,27,1838
49  1720 DATA204,76,51,202,201,2
    55,208,8,169,35,32,27,204,76
    ,51,202,2001
06  1730 DATA32,210,255,162,251,
    32,102,196,76,204,201,32,84,
    201,133,204,2375
29  1740 DATA169,230,141,110,206
    ,169,3,141,111,206,32,164,20
    0,32,50,205,2169
15  1750 DATA169,0,133,212,32,93
    ,201,144,3,76,244,203,201,13
    ,208,10,1942
A8  1760 DATA72,169,60,32,19,204
    ,104,76,220,203,201,17,208,3
    4,172,109,1900
32  1770 DATA206,192,24,240,213,
    192,23,208,7,172,108,206,192
    ,39,240,202,2464
FB  1780 DATA72,169,40,32,247,20
    0,104,32,144,201,32,210,255,
    76,74,202,2090
FA  1790 DATA201,19,208,9,32,144
    ,201,32,84,201,76,74,202,201
    ,20,208,1912
9F  1800 DATA29,173,101,206,13,1
    02,206,240,161,32,144,201,12
    0,32,67,204,2031
9A  1810 DATA32,164,200,32,50,20
    5,169,1,133,205,88,76,74,202
    ,201,29,1861
63  1820 DATA208,22,32,249,204,1
    44,3,76,74,202,32,144,201,32
    ,210,255,2088
B6  1830 DATA169,1,32,247,200,76
    ,74,202,201,133,208,10,169,6
    3,32,19,1836
EE  1840 DATA204,169,254,76,220,
    203,201,134,208,10,169,35,32
    ,19,204,169,2307
64  1850 DATA255,76,220,203,201,
    135,208,10,169,83,32,19,204,
    169,19,76,2079
4E  1860 DATA220,203,201,137,208
    ,13,169,46,32,19,204,32,11,2
    05,169,0,1869
88  1870 DATA76,220,203,201,138,
    208,10,169,68,32,19,204,169,
    20,76,220,2033
EF  1880 DATA203,201,139,208,10,
    169,115,32,19,204,169,147,76
    ,220,203,201,2316
F3  1890 DATA140,208,3,76,244,20
    3,201,141,208,10,72,169,95,3
    2,19,204,2025
53  1900 DATA104,76,220,203,201,
    145,208,24,172,109,206,208,3
    ,76,74,202,2231
0C  1910 DATA72,169,40,32,13,201
    ,104,32,144,201,32,210,255,7
    6,74,202,1857
CC  1920 DATA201,147,208,39,32,8
    4,201,32,164,200,32,50,205,1
    69,147,32,1943
C0  1930 DATA210,255,32,144,201,
    120,169,174,141,0,4,32,61,20
    5,169,0,1917
D2  1940 DATA32,43,204,169,1,133
    ,205,88,76,74,202,201,148,20
    8,20,32,1836
94  1950 DATA249,204,176,93,32,1
    44,201,120,32,155,204,169,1,
    133,205,88,2206
37  1960 DATA76,74,202,201,157,2
    08,24,173,101,206,13,102,206
    ,240,66,169,2218
A4  1970 DATA1,32,13,201,169,157
    ,32,144,201,32,210,255,76,74
    ,202,201,2000
40  1980 DATA32,144,46,201,128,1
    44,8,201,160,144,38,201,192,
    176,34,32,1881
56  1990 DATA249,204,176,29,72,3
    2,210,255,104,76,225,203,32,
    249,204,176,2496
DD  2000 DATA16,32,43,204,169,1,
    32,247,200,169,2,133,205,169
    ,0,133,1755
E1  2010 DATA207,76,74,202,230,2
    04,24,173,106,206,105,230,13
    3,253,173,107,2503
D3  2020 DATA206,105,3,133,254,1
    60,0,152,145,253,169,3,141,1
    9,207,32,1982
56  2030 DATA91,196,96,72,32,249
    ,204,144,3,104,96,72,169,18,
    32,210,1788
34  2040 DATA255,104,32,210,255,
    169,146,32,210,255,96,72,24,
    173,106,206,2345
72  2050 DATA109,101,206,133,251
    ,173,107,206,109,102,206,133
    ,252,160,0,104,2352
40  2060 DATA145,251,96,169,1,32
    ,13,201,173,101,206,133,247,
    133,251,173,2325
7C  2070 DATA102,206,133,248,24,
    105,4,133,252,24,173,106,206
    ,101,247,133,2197
F9  2080 DATA253,173,107,206,101
    ,248,133,254,160,1,177,251,1
    36,145,251,200,2796
22  2090 DATA177,253,136,145,253
    ,162,251,32,102,196,162,253,
    32,102,196,162,2614
7E  2100 DATA247,32,102,196,165,
    247,205,110,206,208,221,165,
    248,205,111,206,2874
BA  2110 DATA208,214,169,32,145,
    251,169,0,145,253,96,169,229
    ,133,251,169,2633
48  2120 DATA7,133,252,24,173,10
    6,206,105,229,133,253,173,10
    7,206,105,3,2215
35  2130 DATA133,254,169,230,133
    ,247,169,3,133,248,160,0,177
    ,251,200,145,2652
AC  2140 DATA251,136,177,253,200
    ,145,253,162,251,32,238,204,
    162,253,32,238,2987
93  2150 DATA204,162,247,32,238,
    204,165,247,205,101,206,208,
    221,165,248,205,3058
D0  2160 DATA102,206,208,214,169
    ,32,145,251,145,253,141,230,
    7,96,214,0,2413
57  2170 DATA181,0,201,255,208,2
    ,214,1,96,160,230,204,101,20
    6,208,9,2276
16  2180 DATA160,3,204,102,206,2
    08,2,56,96,24,96,173,101,206
    ,24,105,1766
7C  2190 DATA1,133,247,173,102,2
    06,105,4,133,248,160,0,169,3
    2,145,247,2105
A7  2200 DATA162,247,32,102,196,
    166,247,224,231,208,243,166,
    248,224,7,208,2911
C0  2210 DATA237,96,24,172,108,2
    06,174,109,206,32,240,255,96
    ,169,0,133,2257
52  2220 DATA251,133,252,173,106
    ,206,133,253,173,107,206,133
    ,254,160,0,169,2709
A4  2230 DATA32,145,253,162,251,
    32,102,196,162,253,32,102,19
    6,165,251,201,2535
DB  2240 DATA232,208,236,165,252
    ,201,3,208,230,96,32,166,197
    ,162,8,32,2428
5F  2250 DATA7,196,32,143,200,17
    6,2,240,4,32,242,197,96,160,
    0,169,1896
98  2260 DATA32,153,0,160,153,0.
    161,153,0,162,153,0,163,153,
    0,164,1607
FF  2270 DATA153,0,165,153,0,166
    ,153,0,167,153,0,168,153,0,1
    69,153,1753
46  2280 DATA0,170,153,0,171,153
    ,0,172,153,0,173,153,0,174,1
    53,0,1625
68  2290 DATA175,153,0,176,153,0
    ,177,153,0,178,153,0,179,153
    ,0,180,1830
9C  2300 DATA153,0,181,153,0,182
    ,153,0,183,153,0,184,153,0,1
    85,153,1833
40  2310 DATA0,186,153,0,187,153
    ,0,188,153,0,189,153,0,190,1
    53,72,1777
60  2320 DATA190,200,208,157,169
    ,0,141,1,160,141,0,164,141,0
    ,168,141,1981
B6  2330 DATA0,172,141,0,176,141
    ,0,180,141,0,184,76,121,205,
    32,253,1822
19  2340 DATA174,32,212,225,32,1
    23,200,162,71,160,191,169,0,
    133,251,169,2304
87  2350 DATA160,133,252,173,19,
    207,141,103,206,169,10,141,1
    9,207,32,97,2069
F2  2360 DATA196,169,251,32,95,2
    25,32,123,200,173,103,206,14
    1,19,207,76,2248
AC  2370 DATA91,196,32,253,174,3
    2,212,225,169,0,32,213,255,1
    76,1,96,2157
FB  2380 DATA76,249,224,32,253,1
    74,32,212,225,162,111,160,20
    7,169,0,133,2419
42  2390 DATA249,169,192,133,250
    ,169,249,32,95,225,96,0,0,0,
    0,0,1859
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PROGRAM: UFK DEMO

```
65  10 REM ************************
    ***********
04  13 REM * YOU MUST SYS 49152
    (WITH UFK *
```

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FC  16 REM * IN MEMORY) AND PRES
    S 'Y' TO  *
46  18 REM * CLEAR THE DATA BEFO
    RE RUNNING*
89  22 REM * THIS. ENTER IT EXAC
    TLY AS IT *
1C  25 REM * LISTED BELOW. YOU C
    AN SAVE   *
85  28 REM * THE DEFINTIONS USIN
    G THE SAVE*
DF  31 REM * SYS IN FIGURE 2 IF
    YOU WISH, *
62  34 REM * ONCE THEY ARE IN ME
    MORY.     *
CA  37 REM *********************
    ***********
2C  40 CL=100:IN=10
37  50 READDT:IFDT=-1THEN95
6E  60 IFDT>255THENAD=DT:GOTO50
F8  70 POKEAD,DT:AD=AD+1:CH=DT:F
    ORB=1TO15:READDT:POKEAD,DT:A
    D=AD+1:CH=CH+DT:NEXT
A0  80 READCK:IFCK<>CHTHENPRINT"
    [DOWN2]ERROR IN LINE";CL:END
35  90 PRINT"LINE";CL;"IS OK":CL
    =CL+IN:GOTO50
6A  95 PRINT"[DOWN2]EVERYTHING O
    K. THE DATA IS NOW IN MEMORY
    ":END
A3  99 DATA 40960
13  100 DATA32,65,61,254,58,66,6
    1,254,58,67,61,254,13,73,70,
    67,1514
89  110 DATA61,49,84,72,69,78,80
    ,82,73,78,84,34,147,34,65,59
    ,1149
9B  120 DATA34,43,34,59,66,59,34
    ,61,34,59,65,43,66,58,83,89,
    887
C5  130 DATA83,52,57,49,54,49,13
    ,73,70,67,61,50,84,72,69,78,
    981
8F  140 DATA80,82,73,78,84,34,14
    7,34,65,59,34,45,34,59,66,59
    ,1033
F4  150 DATA34,61,34,59,65,45,66
    ,58,83,89,83,52,57,49,54,49,
    938
83  160 DATA13,73,70,67,61,51,84
    ,72,69,78,80,82,73,78,84,34,
    1069
B2  170 DATA147,34,65,59,34,42,3
    4,59,66,59,34,61,34,59,65,42
    ,894
F5  180 DATA66,58,83,89,83,52,57
    ,49,54,49,13,73,70,67,61,52,
    976
DE  190 DATA65,78,68,66,60,62,48
    ,84,72,69,78,80,82,73,78,84,
    1147
57  200 DATA34,147,34,65,59,34,4
    7,34,59,66,59,34,61,34,59,65
    ,891
18  210 DATA47,66,58,83,89,83,52
    ,57,49,54,49,13,73,70,67,61,
    971
7E  220 DATA52,84,72,69,78,80,82
    ,73,78,84,34,147,89,79,85,32
    ,1218
2D  230 DATA67,65,78,39,84,32,68
    ,73,86,73,68,69,32,66,89,32,
    1021
C6  240 DATA90,69,82,79,46,34,58
    ,83,89,83,52,57,49,54,49,13,
    987
B3  250 DATA147,84,72,69,32,84,7
    2,73,82,68,32,73,78,80,85,84
    ,1215
7A  260 DATA32,77,85,83,84,32,66
    ,69,32,70,82,79,77,32,49,32,
    981
C4  270 DATA84,79,32,52,46,141,1
    41,141,0,32,32,32,32,32,32,3
    2,940
05  279 DATA 41984
ED  280 DATA76,79,65,68,34,36,34
    ,44,56,13,76,73,83,84,13,32,
    866
AF  290 DATA255,20,32,69,78,84,6
    9,82,32,65,32,70,73,76,69,78
    ,1184
2B  300 DATA65,77,69,32,84,79,32
    ,76,79,65,68,32,70,82,79,77,
    1066
B4  310 DATA32,68,73,83,75,32,65
    ,78,68,32,82,85,78,32,40,79,
    1002
91  320 DATA82,32,80,82,69,83,83
    ,32,82,85,78,32,83,84,79,80,
    1146
7D  330 DATA32,84,79,32,81,85,73
    ,84,41,46,141,141,76,79,65,6
    8,1207
3B  340 DATA34,254,34,44,56,13,8
    2,85,78,13,0,32,32,32,32,32,
    853
C4  349 DATA 43008
0E  350 DATA78,61,254,58,65,61,7
    8,13,73,70,78,62,50,53,53,79
    ,1186
A3  360 DATA82,78,60,48,84,72,69
    ,78,80,82,73,78,84,34,147,78
    ,1227
D4  370 DATA85,77,66,69,82,32,87
    ,82,79,78,71,46,32,73,84,32,
    1075
01  380 DATA83,72,79,85,76,68,32
    ,66,69,32,70,82,79,77,32,48,
    1050
5B  390 DATA32,45,32,50,53,53,34
    ,58,83,89,83,52,57,49,54,49,
    873
D9  400 DATA13,65,36,61,34,48,34
    ,58,73,70,78,62,49,50,55,84,
    870
63  410 DATA72,69,78,78,61,78,45
    ,49,50,56,58,65,36,61,34,49,
    939
84  420 DATA34,13,66,36,61,34,48
    ,34,58,73,70,78,62,54,51,84,
    856
29  430 DATA72,69,78,78,61,78,45
    ,54,52,58,66,36,61,34,49,34,
    925
3D  440 DATA13,67,36,61,34,48,34
    ,58,73,70,78,62,51,49,84,72,
    890
30  450 DATA69,78,78,61,78,45,51
    ,50,58,67,36,61,34,49,34,13,
    862
A2  460 DATA68,36,61,34,48,34,58
    ,73,70,78,62,49,53,84,72,69,
    949
CD  470 DATA78,78,61,78,45,49,54
    ,58,68,36,61,34,49,34,13,69,
    865
5D  480 DATA36,61,34,48,34,58,73
    ,70,78,62,55,84,72,69,78,78,
    990
E0  490 DATA61,78,45,56,58,69,36
    ,61,34,49,34,13,70,36,61,34,
    795
3C  500 DATA48,34,58,73,70,78,62
    ,51,84,72,69,78,78,61,78,45,
    1039
93  510 DATA52,58,70,36,61,34,49
    ,34,13,71,36,61,34,48,34,58,
    749
BE  520 DATA73,70,78,62,49,84,72
    ,69,78,78,61,78,45,49,58,71,
    1075
F3  530 DATA36,61,34,49,34,13,72
    ,36,61,34,48,34,58,73,70,78,
    791
34  540 DATA62,48,84,72,69,78,72
    ,36,61,34,49,34,13,73,36,61,
    882
2D  550 DATA65,36,43,66,36,43,67
    ,36,43,68,36,43,69,36,43,70,
    800
69  560 DATA36,43,71,36,43,72,36
    ,13,80,82,73,78,84,34,147,34
    ,962
1B  570 DATA65,59,34,73,78,32,66
    ,73,78,65,82,89,32,73,83,32,
    1014
32  580 DATA34,59,73,36,13,141,1
    41,0,32,32,32,32,32,32,32,32
    ,753
5D  589 DATA 44032
02  590 DATA78,61,254,58,65,61,7
    3,78,84,40,78,47,49,54,41,58
    ,1179
19  600 DATA66,61,78,45,65,42,49
    ,54,13,73,70,78,60,48,79,82,
    963
BC  610 DATA78,62,50,53,53,84,72
    ,69,78,80,82,73,78,84,34,147
    ,1177
29  620 DATA78,85,77,66,69,82,32
    ,87,82,79,78,71,46,32,73,84,
    1121
B3  630 DATA32,83,72,79,85,76,68
    ,32,66,69,32,70,82,79,77,32,
    1034
E5  640 DATA48,32,84,79,32,50,53
    ,53,34,58,83,89,83,52,57,49,
    936
F4  650 DATA54,49,13,67,61,65,43
    ,52,56,58,73,70,65,62,57,84,
    929
ED  660 DATA72,69,78,67,61,67,43
    ,55,13,68,61,66,43,52,56,58,
    929
C0  670 DATA73,70,66,62,57,84,72
    ,69,78,68,61,68,43,55,13,80,
    1019
7E  680 DATA82,73,78,84,34,147,3
    4,78,59,34,73,78,32,72,69,88
    ,1115
19  690 DATA32,73,83,32,36,34,59
    ,67,72,82,36,40,67,41,67,72,
    893
8B  700 DATA82,36,40,68,41,13,14
    1,141,0,32,32,32,32,32,32,32
    ,786
DC  709 DATA 45056
09  710 DATA79,61,254,58,73,61,2
    54,58,80,61,254,58,82,61,49,
    43,1586
8C  720 DATA80,47,49,48,48,58,89
    ,61,254,58,86,61,79,13,70,79
    ,1180
41  730 DATA82,67,61,49,84,79,89
    ,58,86,61,40,86,43,73,41,42,
    1041
7E  740 DATA82,58,78,69,88,84,13
    ,63,34,147,79,82,73,71,73,78
    ,1172
6C  750 DATA65,76,32,66,65,76,65
    ,78,67,69,58,34,59,79,13,141
    ,1043
02  760 DATA141,141,141,141,141,
    141,63,34,19,34,58,63,34,73,
    78,86,1388
8E  770 DATA69,83,84,77,69,78,84
    ,32,66,69,70,79,82,69,32,73,
    1116
```

```
42   780 DATA78,84,69,82,69,83,84
         ,32,92,34,59,73,13,141,141,1
         41,1275
75   790 DATA141,141,141,141,63,3
         4,19,34,58,63,58,63,34,73,78
         ,84,1225
FA   800 DATA69,82,69,83,84,32,82
         ,65,84,69,32,65,84,34,59,80,
         1073
10   810 DATA59,34,37,34,13,141,1
         41,141,141,141,141,141,63,34
         ,19,34,1314
CA   820 DATA58,63,58,63,58,63,34
         ,89,79,85,32,87,79,85,76,68,
         1077
3A   830 DATA32,72,65,86,69,32,92
         ,34,59,86,13,141,141,141,141
         ,141,1345
60   840 DATA141,141,63,34,19,34,
         58,63,58,63,58,63,58,63,34,6
         5,1015
5F   850 DATA70,84,69,82,34,89,59
         ,34,32,89,69,65,82,83,46,34,
         1021
97   860 DATA13,0,32,32,32,32,32,
         32,32,32,32,32,32,32,32,32,4
         61
4D   869 DATA 46080
E5   870 DATA65,36,61,67,72,82,36
         ,40,49,51,41,43,67,72,82,36,
         900
65   880 DATA40,49,51,41,58,65,36
         ,61,34,147,34,43,65,36,43,65
         ,868
11   890 DATA36,13,66,36,61,34,69
         ,78,84,69,82,32,66,79,82,68,
         955
A1   900 DATA69,82,32,67,79,76,79
         ,85,82,34,13,67,36,61,34,69,
         965
A7   910 DATA78,84,69,82,32,83,67
         ,82,69,69,78,32,67,79,76,79,
         1126
50   920 DATA85,82,34,13,68,36,61
         ,34,69,78,84,69,82,32,67,85,
         979
3E   930 DATA82,83,79,82,32,67,79
         ,76,79,85,82,34,13,80,82,73,
         1108
98   940 DATA78,84,65,36,59,66,36
         ,59,34,19,34,59,13,66,61,254
         ,1023
DE   950 DATA13,80,82,73,78,84,65
         ,36,59,67,36,59,34,19,34,59,
         878
77   960 DATA13,67,61,254,13,80,8
         2,73,78,84,65,36,59,68,36,59
         ,1128
94   970 DATA34,19,34,59,13,68,61
         ,254,13,80,82,73,78,84,65,36
         ,1053
D0   980 DATA13,80,79,75,69,53,51
         ,50,56,48,44,66,58,80,79,75,
         976
7B   990 DATA69,53,51,50,56,49,44
         ,67,58,80,79,75,69,54,52,54,
         960
4D   1000 DATA44,68,58,80,82,73,7
         8,84,65,36,13,0,32,32,32,32,
         809
2F   1009 DATA 47104
C9   1010 DATA147,84,72,73,83,32,
         80,82,79,71,82,65,77,32,87,7
         3,1219
92   1020 DATA76,76,32,80,69,82,7
         0,79,82,77,32,65,32,78,69,87
         ,1086
AE   1030 DATA46,32,73,70,32,89,7
         9,85,32,68,79,32,78,79,84,32
         ,990
0F   1040 DATA87,65,78,84,32,84,7
         2,73,83,32,84,72,69,78,32,80
         ,1105
C8   1050 DATA82,69,83,83,32,82,8
         5,78,32,83,84,79,80,32,78,79
         ,1141
92   1060 DATA87,79,82,32,80,82,6
         9,83,83,32,65,78,89,32,79,84
         ,1136
4A   1070 DATA72,69,82,32,75,69,8
         9,32,84,79,32,67,79,78,84,73
         ,1096
CF   1080 DATA78,85,69,46,141,32,
         255,20,78,69,87,13,49,48,80,
         79,1229
7D   1090 DATA75,69,53,51,50,56,4
         8,44,49,58,58,70,79,82,73,61
         ,976
77   1100 DATA49,84,79,48,58,58,8
         0,79,75,69,53,51,50,56,48,44
         ,981
8F   1110 DATA48,58,58,71,79,84,7
         9,49,48,13,147,141,141,141,1
         41,141,1439
00   1120 DATA141,141,141,141,141
         ,141,141,32,32,32,32,32,32,3
         2,80,82,1373
06   1130 DATA69,84,84,89,32,66,7
         9,82,68,69,82,32,80,65,84,84
         ,1149
4A   1140 DATA69,82,78,83,33,33,3
         3,33,33,141,19,82,85,78,13,0
         ,895
89   1149 DATA 48128
30   1150 DATA9,14,16,21,20,32,20
         ,23,15,32,14,21,13,2,5,18,27
         5
27   1160 DATA19,32,40,1,38,2,41,
         46,9,14,16,21,20,3,61,32,395

10   1170 DATA49,32,6,15,18,32,43
         ,44,50,32,6,15,18,32,45,44,4
         81
4C   1180 DATA32,51,32,6,15,18,32
         ,42,44,32,52,32,6,15,18,32,4
         59
6B   1190 DATA47,46,32,20,8,5,14,
         32,1,14,19,23,5,18,32,9,325
50   1200 DATA19,32,20,8,5,14,32,
         16,18,9,14,20,5,4,46,32,294
8A   1210 DATA1,32,2,9,20,32,19,9
         ,12,12,25,32,20,8,9,19,261
AD   1220 DATA32,15,14,5,33,32,32
         ,32,12,15,1,4,19,32,4,9,291
D4   1230 DATA18,5,3,20,15,18,25,
         44,12,9,19,20,19,32,1,14,274

0B   1240 DATA4,32,23,1,9,20,19,3
         2,6,15,18,32,11,5,25,46,298
DB   1250 DATA20,8,5,14,32,7,5,20
         ,19,32,1,32,6,9,12,5,227
8F   1260 DATA14,1,13,5,32,20,15,
         32,12,15,1,4,32,1,14,4,215
9A   1270 DATA32,18,21,14,46,32,3
         2,20,1,16,5,32,21,19,5,18,33
         2
26   1280 DATA19,32,4,15,32,14,15
         ,20,32,21,19,5,32,6,50,33,34
         9
22   1290 DATA32,32,32,32,32,32,3
         2,32,32,32,32,32,32,32,32,32
         ,512
7D   1300 DATA9,14,16,21,20,32,1,
         32,14,21,13,2,5,18,32,6,256
AE   1310 DATA18,15,13,32,48,32,2
         0,15,32,50,53,53,46,20,8,5,4
         60
F2   1320 DATA32,2,9,14,1,18,25,5
         ,17,21,9,22,1,12,5,14,207
3E   1330 DATA20,32,9,19,32,3,1,1
         2,3,21,12,1,20,5,4,32,226
11   1340 DATA1,14,4,32,16,18,9,1
         4,20,5,4,46,32,32,32,32,311
7E   1350 DATA32,32,32,32,32,32,3
         2,32,32,32,32,32,32,32,32,32
         ,512
EC   1360 DATA32,32,32,32,32,32,3
         2,32,32,32,32,32,32,32,32,32
         ,512
10   1370 DATA32,32,32,32,32,32,3
         2,32,9,14,16,21,20,32,14,21,
         403
4F   1380 DATA13,2,5,18,32,6,18,1
         5,13,32,48,32,20,15,32,50,35
         1
11   1390 DATA53,53,46,32,20,8,5,
         32,8,5,24,32,32,32,32,5,419
DD   1400 DATA17,21,9,22,1,12,5,1
         4,20,32,9,19,32,3,1,12,229
03   1410 DATA3,21,12,1,20,5,4,32
         ,1,14,4,32,16,18,9,14,206
EB   1420 DATA20,5,4,46,32,32,32,
         32,32,32,32,32,32,32,32,32,4
         59
2E   1430 DATA32,32,32,32,32,32,3
         2,32,32,32,32,32,32,32,32,32
         ,512
1C   1440 DATA32,32,32,32,32,32,3
         2,32,32,32,32,32,32,32,32,32
         ,512
72   1450 DATA5,14,20,5,18,32,15,
         18,9,7,46,2,1,12,1,14,219
31   1460 DATA3,5,44,32,25,5,1,18
         ,12,25,32,9,14,22,5,19,271
76   1470 DATA20,13,5,14,20,44,32
         ,9,14,20,5,18,5,19,20,32,290

4C   1480 DATA18,1,20,5,44,14,21,
         13,2,5,18,32,15,6,32,25,271
03   1490 DATA5,1,18,19,46,20,8,5
         ,32,1,13,15,21,14,20,20,258
41   1500 DATA8,1,20,32,23,15,21,
         12,4,32,2,5,32,9,14,32,262
D9   1510 DATA20,8,5,32,2,1,14,11
         ,32,9,19,32,16,18,9,14,242
7C   1520 DATA20,5,4,33,33,32,32,
         32,5,14,20,5,18,32,2,15,302
B4   1530 DATA18,4,5,18,44,19,3,1
         8,5,5,14,44,3,21,18,19,258
E4   1540 DATA15,18,32,3,15,12,15
         ,21,18,19,32,1,19,32,32,20,3
         04
95   1550 DATA8,5,9,18,32,14,21,1
         3,2,5,18,19,46,32,32,32,306
45   1560 DATA32,32,32,32,32,32,3
         2,32,32,32,32,32,32,32,32,32
         ,512
33   1570 DATA32,32,32,32,32,32,3
         2,32,32,32,32,32,32,32,32,32
         ,512
F9   1580 DATA32,32,32,32,32,32,3
         2,32,32,32,32,32,32,32,32,32
         ,512
E7   1590 DATA32,32,32,32,32,32,3
         2,32,32,32,32,32,32,32,32,32
         ,512
A6   1600 DATA16,5,18,6,15,18,13,
         19,32,1,32,14,5,23,32,9,258
69   1610 DATA6,32,25,15,21,32,16
         ,18,5,19,19,32,1,32,11,5,289

B8   1620 DATA25,32,40,18,21,14,3
         2,19,20,15,16,32,23,9,12,12,
         340
EB   1630 DATA32,1,2,15,18,20,41,
         32,1,14,4,32,3,18,5,1,239
5C   1640 DATA20,5,19,32,1,32,19,
         13,1,12,12,32,1,14,4,19,236
A1   1650 DATA9,12,12,25,32,2,1,1
         9,9,3,32,16,18,15,7,18,230
A0   1660 DATA1,13,32,23,8,9,3,8,
         32,9,20,32,18,21,14,19,262
33   1670 DATA -1
```

Morse Code Tutor

program: morse loader

Read the instructions with the article BEFORE running this program.

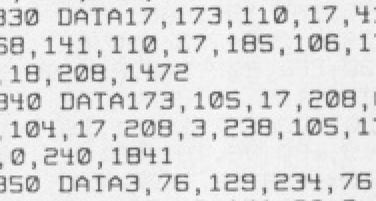
```
97  40 FL=100:LL=2900:IN=10:AD=2
    049:CS=1
E4  50 FORA=0TO(LL-FL)/IN
4D  60 FORB=1TO16:READDT:POKEAD,
    DT:AD=AD+1:CH=CH+DT:NEXT
6D  70 IFCS=1THENREADCK:IFCK=CHT
    HENCH=0:PRINT"LINE";FL+A*IN;
    "IS OK":NEXT:GOTO90
65  75 IFCS=0THENNEXT:GOTO90
F3  80 PRINT"[DOWN2]ERROR IN LIN
    E";FL+A*IN:END
ED  90 PRINT"[DOWN2]EVERYTHING O
    K. THE DATA IS NOW IN MEMORY
    ":END
2F  100 DATA27,8,195,7,158,32,50
    ,48,56,48,32,40,67,41,32,71,
    912
FC  110 DATA46,72,65,67,75,87,17
    6,84,72,0,0,0,48,50,0,76,818
02  120 DATA111,17,0,3,8,13,17,1
    9,24,28,33,36,41,45,50,53,49
    8
5F  130 DATA56,60,65,70,74,78,80
    ,84,89,93,98,103,108,114,120
    ,126,1418
55  140 DATA132,138,144,150,156,
    162,168,175,182,188,195,202,
    209,215,221,228,2865
D3  150 DATA234,1,3,0,3,1,1,1,0,
    3,1,3,1,0,3,1,256
66  160 DATA1,0,1,0,1,1,3,1,0,3,
    3,1,0,1,1,1,18
97  170 DATA1,0,1,1,0,1,3,3,3,0,
    3,1,3,0,1,3,24
55  180 DATA1,1,0,3,3,0,3,1,0,3,
    3,3,0,1,3,3,28
7F  190 DATA1,0,3,3,1,3,0,1,3,1,
    0,1,1,1,0,3,22
49  200 DATA0,1,1,3,0,1,1,1,3,0,
    1,3,3,0,3,1,22
89  210 DATA1,3,0,3,1,3,3,0,3,3,
    1,1,0,1,3,3,29
DB  220 DATA3,3,0,1,1,3,3,3,0,1,
    1,1,3,3,0,1,27
A0  230 DATA1,1,1,3,0,1,1,1,1,1,
    0,3,1,1,1,1,18
83  240 DATA0,3,3,1,1,1,0,3,3,3,
    1,1,0,3,3,3,29
42  250 DATA3,1,0,3,3,3,3,3,0,1,
    3,1,3,1,3,0,31
FF  260 DATA3,3,1,1,3,3,0,3,3,3,
    1,1,0,1,1,3,30
8E  270 DATA3,1,1,0,1,3,3,3,3,1,
    0,3,1,1,1,1,26
40  280 DATA3,0,3,1,1,3,1,0,3,1,
    3,3,1,0,3,1,27
C6  290 DATA3,3,1,3,0,3,1,1,1,3,
    0,1,3,1,1,3,28
FE  300 DATA1,0,147,28,32,32,32,
    32,32,32,32,32,32,32,32,32,5
    60
9C  310 DATA32,32,77,79,82,83,69
    ,32,84,69,83,84,69,82,13,150
    ,1120
FB  320 DATA32,32,32,32,32,32,32
    ,32,32,32,32,32,32,32,96,96,
    640
EA  330 DATA96,96,96,96,96,96,96
    ,96,96,96,13,13,13,31,32,49,
    1111
3A  340 DATA41,32,83,69,76,69,67
    ,84,32,67,72,65,82,65,67,84,
    1055
77  350 DATA69,82,83,32,84,79,32
    ,66,69,32,84,69,83,84,69,68,
    1085
61  360 DATA46,13,13,32,50,41,32
    ,73,78,80,85,84,32,83,84,82,
    908
B0  370 DATA73,78,71,83,32,84,79
    ,32,66,69,32,83,69,78,84,46,
    1059
24  380 DATA13,13,32,51,41,32,66
    ,69,71,73,78,32,84,69,83,84,
    891
CA  390 DATA46,13,13,13,155,117,
    96,96,96,96,96,96,96,96,96,9
    6,1317
5F  400 DATA96,96,96,96,96,96,96
    ,96,96,96,96,96,96,96,96,96,
    1536
E1  410 DATA96,96,96,96,96,96,96
    ,96,96,96,96,96,105,98,13,15
    7,1525
D3  420 DATA98,171,96,96,96,96,9
    6,96,96,96,96,96,96,96,96,96
    ,1613
4D  430 DATA96,96,96,96,96,96,96
    ,96,96,96,96,96,96,96,96,96,
    1536
F5  440 DATA96,96,96,96,96,96,96
    ,96,179,98,13,157,98,171,96,
    96,1676
21  450 DATA96,96,96,96,96,96,96
    ,96,96,96,96,96,96,96,96,96,
    1536
0B  460 DATA96,96,96,96,96,96,96
    ,96,96,96,96,96,96,96,96,96,
    1536
4B  470 DATA96,96,96,96,179,98,1
    3,157,98,171,96,96,96,96,96,
    96,1676
AF  480 DATA96,96,96,96,96,96,96
    ,96,96,96,96,96,96,96,96,96,
    1536
C9  490 DATA96,96,96,96,96,96,96
    ,96,96,96,96,96,96,96,96,96,
    1536
BC  500 DATA179,98,13,157,98,106
    ,96,96,96,96,96,96,96,96,96,
    96,1611
1D  510 DATA96,96,96,96,96,96,96
    ,96,96,96,96,96,96,96,96,96,
    1536
3E  520 DATA96,96,96,96,96,96,96
    ,96,96,96,96,96,107,13,144,3
    2,1448
3B  530 DATA32,32,32,32,32,32,32
    ,32,32,80,76,69,65,83,69,32,
    762
DA  540 DATA83,69,76,69,67,84,32
    ,79,80,84,73,79,78,13,13,13,
    992
6E  550 DATA28,32,32,32,32,32,32
    ,32,32,32,32,40,67,41,32,49,
    577
29  560 DATA57,56,55,32,71,46,72
    ,65,67,75,87,79,82,84,72,19,
    1019
52  570 DATA17,17,17,17,17,17,17
    ,17,17,17,17,17,29,152,87,79
    ,551
99  580 DATA82,68,83,32,80,69,82
    ,32,77,73,78,85,84,69,58,17,
    1069
6A  590 DATA17,157,157,157,157,1
    57,157,157,157,157,157,157,1
    57,157,157,157,2372
82  600 DATA157,157,68,69,76,65,
    89,32,66,69,84,87,69,69,78,3
    2,1267
AB  610 DATA76,69,84,84,69,82,83
    ,58,17,17,157,157,157,157,15
    7,157,1581
69  620 DATA157,157,157,157,157,
    157,157,157,157,157,157,157,
    157,157,157,157,2512
5B  630 DATA68,69,76,65,89,32,66
    ,69,84,87,69,69,78,32,87,79,
    1119
76  640 DATA82,68,83,58,17,17,15
    7,157,157,157,157,157,157,15
    7,157,157,1895
1B  650 DATA157,157,157,157,157,
    157,157,157,157,157,78,79,46
    ,32,79,70,1954
24  660 DATA32,71,82,79,85,80,83
    ,32,84,79,32,66,69,32,83,69,
    1058
71  670 DATA78,84,58,29,29,29,29
    ,29,29,145,145,145,145,145,1
    45,154,1418
D0  680 DATA40,70,49,47,70,50,41
    ,17,17,157,157,157,157,157,1
    57,157,1500
AC  690 DATA40,70,51,47,70,52,41
    ,17,17,17,17,157,157,157,157
    ,157,1224
67  700 DATA157,157,40,70,53,47,
    70,54,41,19,0,1,2,3,4,5,723
7C  710 DATA6,7,8,9,10,11,12,13,
    14,15,16,17,18,19,20,21,216
C6  720 DATA22,23,24,25,26,49,50
    ,51,52,53,54,55,56,57,48,46,
    691
81  730 DATA44,58,63,39,45,47,40
    ,41,61,34,128,128,128,128,12
    8,128,1240
F3  740 DATA128,128,128,128,128,
    128,128,128,128,128,128,128,
    128,128,128,128,2048
81  750 DATA128,128,128,128,128,
    128,128,128,128,128,128,128,
    128,128,128,128,2048
54  760 DATA128,128,128,128,128,
    128,128,128,128,11,10,3,7,20
    ,0,68,1271
3B  770 DATA79,84,83,0,0,0,40,0,
    0,0,4,0,147,28,32,32,529
9F  780 DATA32,32,32,32,32,32,32
    ,32,67,72,65,82,65,67,84,69,
    827
B3  790 DATA82,32,83,69,76,69,67
    ,84,73,79,78,46,13,150,32,32
    ,1065
37  800 DATA32,32,32,32,32,32,32
    ,32,96,96,96,96,96,96,96,96,
    1024
59  810 DATA96,96,96,96,96,96,96
    ,96,96,96,96,96,13,13,13,154
    ,1345
E0  820 DATA32,76,69,84,84,69,82
    ,83,58,13,155,32,176,96,96,9
    6,1301
8F  830 DATA96,96,96,96,96,96,96
    ,96,96,96,96,96,96,96,96,96,
    1536
FA  840 DATA96,96,96,96,96,96,96
    ,174,31,32,67,84,82,76,43,76
    ,1337
B3  850 DATA13,155,32,98,32,32,3
    2,32,32,32,32,32,32,32,32,32
    ,682
06  860 DATA32,32,32,32,32,32,32
    ,32,32,32,32,32,32,32,98,31,
    577
D7  870 DATA32,84,79,71,71,76,69
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```
   ,83,13,155,32,173,96,96,96,9
   6,1322
51 880 DATA96,96,96,96,96,96,96
   ,96,96,96,96,96,96,96,96,96,
   1536
0D 890 DATA96,96,96,96,96,96,18
   9,31,32,65,76,76,46,13,13,15
   4,1271
5A 900 DATA32,78,85,77,66,69,82
   ,83,58,32,32,32,32,32,32,32,
   854
15 910 DATA32,32,32,32,32,32,32
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   6,1227
68 920 DATA96,96,96,96,96,96,96
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   6,1547
05 930 DATA96,96,96,96,96,174,3
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35 940 DATA32,155,98,150,32,73,
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04 950 DATA83,32,155,98,13,32,9
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BC 960 DATA32,98,31,32,84,79,71
   ,71,76,69,83,32,32,155,98,13
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68 970 DATA157,157,98,13,32,173
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   96,1590
EB 980 DATA189,31,32,65,76,76,4
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   32,1111
A3 990 DATA80,82,69,83,83,73,78
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   ,1174
50 1000 DATA13,157,157,157,157,
   157,157,157,157,157,157,157,
   157,157,157,157,2368
26 1010 DATA157,157,98,151,32,6
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   ,79,1359
32 1020 DATA78,32,155,98,13,154
   ,32,80,85,78,67,84,85,65,84,
   73,1263
BD 1030 DATA79,78,58,32,32,32,3
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16 1040 DATA32,84,72,69,32,75,6
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   31,1482
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5A 1070 DATA76,32,84,79,71,71,7
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46 1080 DATA32,32,32,32,32,32,3
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   ,715
F9 1090 DATA71,76,69,83,32,155,
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   78,1225
34 1100 DATA65,66,76,69,32,32,1
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   96,1291
75 1110 DATA96,96,96,96,96,1
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   2,1187
8B 1120 DATA32,155,98,151,32,79
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01 1130 DATA32,32,155,98,13,13,
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   157,157,157,1913
95 1140 DATA157,157,157,157,157
   ,157,157,98,31,32,82,69,86,6
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EB 1150 DATA69,32,67,72,65,82,3
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   96,1341
9E 1160 DATA96,96,96,96,96,96,9
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   ,1536
B1 1170 DATA96,179,31,32,73,83,
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75 1180 DATA32,155,98,13,98,13,
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   157,157,157,1979
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   ,157,157,98,13,157,157,98,13
   ,98,31,32,1796
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   ,970
C0 1210 DATA46,32,32,32,32,155,
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   96,1364
56 1220 DATA96,96,96,96,96,189,
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   8,1128
78 1230 DATA73,83,65,66,76,69,8
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6E 1240 DATA98,13,98,13,157,157
   ,157,157,157,157,157,157,157
   ,157,157,157,2106
8F 1250 DATA157,157,157,157,157
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   ,32,69,1513
03 1260 DATA88,73,84,13,155,173
   ,96,96,96,96,96,96,96,96,96,
   96,1546
DE 1270 DATA96,96,96,96,96,96,9
   6,96,96,96,96,96,189,0,65,66
   ,1472
AD 1280 DATA67,68,69,70,71,72,7
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   ,1192
FF 1290 DATA83,84,85,86,87,88,8
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F5 1300 DATA57,48,46,44,58,63,3
   9,45,47,40,41,61,34,5,9,11,6
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A3 1310 DATA7,1,9,9,7,3,13,9,9,
   7,5,11,11,13,7,5,126
0A 1320 DATA3,7,9,9,11,13,11,17
   ,15,13,11,9,11,13,15,17,184
06 1330 DATA19,17,19,15,15,19,1
   5,13,15,19,13,15,46,47,221,2
   ,510
1B 1340 DATA2,0,16,1,189,0,16,1
   47,31,28,32,32,32,32,32,32,6
   22
0F 1350 DATA32,32,32,32,32,32,3
   2,77,69,83,83,65,71,69,32,83
   ,856
7C 1360 DATA69,78,68,69,82,13,1
   50,32,32,32,32,32,32,32,32,3
   2,817
EF 1370 DATA32,32,32,32,96,96,9
   6,96,96,96,96,96,96,96,96,96
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77 1380 DATA96,96,13,13,31,69,7
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   ,1046
F2 1390 DATA32,40,80,82,69,83,8
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   ,1097
D0 1400 DATA79,32,83,69,78,68,4
   1,13,13,151,91,13,13,13,13,1
   3,783
02 1410 DATA13,13,13,13,13,13,1
   3,13,13,13,13,13,13,157,93,3
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EF 1420 DATA13,32,32,32,32,32,3
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   ,792
59 1430 DATA32,84,79,32,82,69,8
   4,85,82,78,32,84,79,32,77,69
   ,1080
70 1440 DATA78,85,19,0,0,0,0,14
   7,31,13,13,13,13,13,13,13,45
   1
37 1450 DATA13,13,13,13,13,32,3
   2,32,32,32,32,32,32,32,32,32
   ,417
C1 1460 DATA80,82,69,83,83,32,7
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   ,1074
40 1470 DATA84,46,0,147,31,13,1
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   ,451
DA 1480 DATA13,32,32,32,32,32,3
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   ,585
BB 1490 DATA69,65,83,69,32,87,6
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90 1500 DATA0,147,31,32,32,32,3
   2,84,72,73,83,32,73,83,32,65
   ,903
3F 1510 DATA32,76,73,83,84,32,7
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16 1520 DATA82,65,67,84,69,82,8
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AD 1530 DATA82,69,32,83,69,78,8
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13 1550 DATA32,32,32,32,32,32,8
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   ,887
C7 1560 DATA79,82,68,32,84,72,6
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   ,1095
E3 1570 DATA84,46,13,13,28,0,13
   ,13,13,13,13,31,80,82,69,83,
   594
76 1580 DATA83,32,65,78,89,32,7
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   ,1074
87 1590 DATA85,82,78,32,84,79,3
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   ,1054
88 1600 DATA77,69,78,85,0,15,67
   ,0,0,0,78,156,234,0,169,1,10
   29
8B 1610 DATA141,32,208,169,1,14
   1,33,208,169,255,141,138,2,1
   69,0,141,1948
9A 1620 DATA145,2,169,142,32,21
   0,255,169,128,141,145,2,169,
   67,133,251,2160
F4 1630 DATA169,9,133,252,32,15
   5,17,76,173,17,160,0,177,251
   ,240,11,1872
0B 1640 DATA32,210,255,200,208,
   246,230,252,76,157,17,96,169
   ,11,141,134,2434
96 1650 DATA2,160,19,162,12,24,
   32,240,255,169,0,174,43,12,3
   2,205,1541
AF 1660 DATA189,169,32,32,210,2
   55,160,24,162,14,24,32,240,2
   55,169,0,1967
4E 1670 DATA174,44,12,32,205,18
   9,169,12,141,134,2,169,32,32
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FC 1680 DATA32,119,18,169,11,14
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   240,255,1537
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10  1690 DATA169,0,174,45,12,32,
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    ,32,32,1517
50  1700 DATA210,255,32,119,18,1
    69,32,32,210,255,169,11,141,
    134,2,160,1949
40  1710 DATA27,162,18,24,32,240
    ,255,173,47,12,174,46,12,32,
    205,189,1648
4C  1720 DATA169,32,32,210,255,3
    2,210,255,32,134,18,201,133,
    208,3,76,2000
58  1730 DATA140,18,201,137,208,
    3,76,158,18,201,134,208,3,76
    ,176,18,1775
2D  1740 DATA201,138,208,3,76,20
    3,18,201,135,208,3,76,221,18
    ,201,139,2049
47  1750 DATA208,3,76,13,19,201,
    49,208,6,32,49,19,76,111,17,
    201,1288
BB  1760 DATA50,208,6,32,214,21,
    76,111,17,201,51,208,6,32,22
    6,22,1481
04  1770 DATA76,111,17,76,41,18,
    160,0,185,48,12,240,7,32,210
    ,255,1488
1E  1780 DATA200,76,121,18,96,32
    ,228,255,240,251,96,238,43,1
    2,173,43,2122
D0  1790 DATA12,201,51,208,5,169
    ,5,141,43,12,76,173,17,206,4
    3,12,1374
F6  1800 DATA173,43,12,201,4,208
    ,243,169,50,141,43,12,76,155
    ,18,238,1786
AC  1810 DATA44,12,173,44,12,201
    ,10,208,5,169,3,141,44,12,24
    ,173,1275
5C  1820 DATA44,12,105,4,141,45,
    12,76,155,18,206,44,12,173,4
    4,12,1103
11  1830 DATA201,2,208,234,169,9
    ,141,44,12,76,191,18,238,46,
    12,208,1809
E8  1840 DATA3,238,47,12,24,173,
    46,12,105,24,141,53,12,173,4
    7,12,1122
48  1850 DATA105,252,141,54,12,1
    73,53,12,208,15,173,54,12,20
    8,10,169,1651
28  1860 DATA0,141,47,12,169,1,1
    41,46,12,76,155,18,206,46,12
    ,173,1255
02  1870 DATA46,12,201,255,208,3
    ,206,47,12,173,46,12,208,235
    ,173,47,1884
BF  1880 DATA12,208,230,169,231,
    141,46,12,169,3,141,47,12,76
    ,155,18,1670
BF  1890 DATA169,61,133,251,169,
    12,133,252,32,155,17,32,190,
    19,32,134,1791
93  1900 DATA18,201,133,208,3,76
    ,132,19,201,134,208,3,76,140
    ,19,201,1772
8C  1910 DATA140,208,3,76,12,20,
    201,12,208,3,76,157,19,201,1
    4,208,1558
F3  1920 DATA3,76,164,19,201,16,
    208,3,76,171,19,160,46,217,9
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B1  1930 DATA240,6,136,16,248,76
    ,60,19,185,251,11,73,128,153
    ,251,11,1864
B4  1940 DATA76,60,19,169,128,32
    ,148,19,76,60,19,169,0,32,14
    8,19,1174
4D  1950 DATA76,60,19,160,46,153
    ,251,11,136,16,250,96,160,0,
    162,26,1622
C5  1960 DATA76,175,19,160,26,16
    2,10,76,175,19,160,36,162,11
    ,185,251,1703
1B  1970 DATA11,73,128,153,251,1
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63  1980 DATA134,2,169,242,133,2
    51,169,4,133,252,162,26,160,
    0,32,241,2110
B9  1990 DATA19,169,186,133,251,
    169,5,133,252,162,10,160,26,
    32,241,19,1967
B7  2000 DATA169,130,133,251,169
    ,6,133,252,162,11,160,36,32,
    241,19,96,2000
9A  2010 DATA185,251,11,25,204,1
    1,140,189,15,160,0,145,251,1
    72,189,15,1963
89  2020 DATA200,230,251,208,2,2
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    141,190,15,2624
7D  2030 DATA141,191,15,141,192,
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    238,190,15,2052
04  2040 DATA24,185,142,15,109,1
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    105,0,141,1654
FF  2050 DATA192,15,136,16,227,1
    69,0,141,196,15,173,190,15,1
    41,195,15,1836
80  2060 DATA173,191,15,141,193,
    15,173,192,15,141,194,15,32,
    91,21,173,1775
7E  2070 DATA193,15,141,42,12,17
    3,197,15,141,195,15,173,198,
    15,141,196,1862
29  2080 DATA15,169,0,141,194,15
    ,173,190,15,141,193,15,32,91
    ,21,173,1578
2D  2090 DATA194,15,208,10,173,1
    93,15,201,2,176,3,238,42,12,
    169,0,1651
D7  2100 DATA141,191,15,141,192,
    15,141,56,12,141,60,12,173,4
    2,12,141,1485
3B  2110 DATA55,12,173,43,12,141
    ,59,12,32,146,21,32,194,21,1
    69,0,1122
A6  2120 DATA141,56,12,141,60,12
    ,173,43,12,141,59,12,173,44,
    12,141,1232
57  2130 DATA55,12,32,146,21,32,
    194,21,173,191,15,141,55,12,
    173,192,1465
C7  2140 DATA15,141,56,12,169,0,
    141,60,12,141,191,15,141,192
    ,15,169,1470
71  2150 DATA5,141,59,12,32,146,
    21,32,194,21,56,173,191,15,2
    37,44,1379
16  2160 DATA12,141,191,15,173,1
    92,15,233,0,141,192,15,169,0
    ,141,56,1686
4D  2170 DATA12,141,60,12,173,43
    ,12,141,55,12,169,4,141,59,1
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6B  2180 DATA146,21,32,194,21,56
    ,173,191,15,233,4,141,191,15
    ,141,195,1769
8B  2190 DATA15,173,192,15,233,0
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    24,141,193,2055
DA  2200 DATA15,169,46,141,194,1
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    9,15,173,1633
4C  2210 DATA197,15,141,195,15,1
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    ,15,141,193,2014
C8  2220 DATA15,173,192,15,141,1
    94,15,32,91,21,173,194,15,20
    8,10,173,1662
F0  2230 DATA193,15,201,2,176,3,
    238,199,15,96,173,195,15,13,
    196,15,1745
4A  2240 DATA56,240,45,162,17,16
    9,0,168,240,22,46,197,15,46,
    198,15,1636
FC  2250 DATA56,173,197,15,237,1
    95,15,168,173,198,15,237,196
    ,15,144,6,2040
27  2260 DATA140,197,15,141,198,
    15,46,193,15,46,194,15,202,2
    08,219,24,1868
06  2270 DATA96,169,0,141,57,12,
    141,58,12,162,17,24,110,58,1
    2,110,1179
8E  2280 DATA57,12,110,56,12,110
    ,55,12,144,19,24,173,59,12,1
    09,57,1021
97  2290 DATA12,141,57,12,173,60
    ,12,109,58,12,141,58,12,202,
    208,220,1487
27  2300 DATA96,24,173,55,12,109
    ,191,15,141,191,15,173,56,12
    ,109,192,1564
2B  2310 DATA15,141,192,15,96,16
    9,200,133,251,169,15,133,252
    ,32,155,17,1985
82  2320 DATA169,17,141,191,15,1
    69,2,141,192,15,169,47,141,1
    90,15,32,1646
21  2330 DATA54,20,160,1,162,5,2
    4,32,240,255,169,12,141,134,
    2,169,1580
26  2340 DATA0,133,204,169,0,141
    ,101,16,141,102,16,32,134,18
    ,201,140,1548
E4  2350 DATA208,5,169,1,133,204
    ,96,201,13,208,7,169,1,133,2
    04,76,1828
22  2360 DATA195,22,201,32,208,8
    ,141,103,16,169,50,76,120,22
    ,201,20,1584
B1  2370 DATA208,46,173,102,16,2
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    101,16,173,1991
FA  2380 DATA101,16,201,255,208,
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    55,169,32,1995
00  2390 DATA141,150,7,169,29,14
    1,151,7,169,11,141,151,219,7
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BC  2400 DATA141,103,16,160,46,1
    85,95,15,205,103,16,208,4,15
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10  2410 DATA22,136,16,241,76,12
    ,22,32,126,22,76,12,22,170,1
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7E  2420 DATA16,24,105,51,141,53
    ,12,173,102,16,105,253,141,5
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06  2430 DATA6,173,53,12,208,1,9
    6,169,109,133,251,169,25,133
    ,252,24,1814
82  2440 DATA173,101,16,101,251,
    133,251,173,102,16,101,252,1
    33,252,160,0,2215
24  2450 DATA138,145,251,173,103
    ,16,32,210,255,238,101,16,20
    8,3,238,102,2229
EC  2460 DATA16,96,169,255,32,21
    0,23,169,0,133,212,169,1,141
    ,32,208,1866
90  2470 DATA169,104,133,251,169
    ,16,133,252,32,155,17,32,38,
    24,76,214,1815
F1  2480 DATA21,32,12,20,173,190
    ,15,208,1,96,169,148,133,251
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07  2490 DATA133,252,32,155,17,1
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     15,212,169,2096
02   2500 DATA129,141,18,212,169,
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77   2510 DATA190,16,173,47,12,14
     1,191,16,32,254,23,206,190,1
     6,173,190,1870
F1   2520 DATA16,201,255,208,3,20
     6,191,16,173,190,16,208,235,
     173,191,16,2298
3D   2530 DATA208,230,169,255,32,
     210,23,169,0,133,212,169,104
     ,133,251,169,2467
23   2540 DATA16,133,252,169,128,
     141,18,212,169,15,141,24,212
     ,169,1,141,1941
F6   2550 DATA32,208,32,84,25,32,
     155,17,32,38,24,169,194,133,
     251,169,1595
A3   2560 DATA16,133,252,32,155,1
     7,169,109,133,251,169,25,133
     ,252,160,0,2006
9D   2570 DATA177,251,201,255,208
     ,3,76,195,23,172,192,16,208,
     8,172,193,2350
9F   2580 DATA16,208,3,76,195,23,
     201,50,208,27,169,32,32,210,
     255,32,1737
AA   2590 DATA134,18,56,32,240,25
     5,192,34,144,8,169,13,32,210
     ,255,32,1824
36   2600 DATA210,255,76,173,23,1
     68,185,95,15,32,210,255,230,
     251,208,2,2388
2F   2610 DATA230,252,206,192,16,
     173,192,16,201,255,208,3,206
     ,193,16,76,2435
3D   2620 DATA111,23,169,55,133,2
     51,169,17,133,252,32,155,17,
     32,134,18,1701
51   2630 DATA96,170,169,109,133,
     251,169,25,133,252,24,173,10
     1,16,101,251,2173
53   2640 DATA133,251,173,102,16,
     101,252,133,252,160,0,138,14
     5,251,173,27,2307
EB   2650 DATA212,141,32,208,238,
     101,16,208,3,238,102,16,96,1
     62,5,32,1810
B4   2660 DATA21,24,168,138,72,15
     2,32,210,23,104,170,202,208,
     241,169,50,1984
A4   2670 DATA32,210,23,96,173,27
     ,212,74,74,201,47,176,247,16
     8,185,251,2196
DC   2680 DATA11,240,241,152,96,3
     2,186,24,169,109,133,251,169
     ,25,133,252,2223
AA   2690 DATA32,228,255,201,140,
     208,9,32,56,25,169,16,141,4,
     212,96,1824
2E   2700 DATA160,0,177,251,201,2
     55,240,239,201,50,208,3,76,1
     42,24,32,2259
3D   2710 DATA100,24,238,192,16,2
     08,3,238,193,16,230,251,208,
     210,230,252,2609
86   2720 DATA76,49,24,168,185,35
     ,8,168,132,253,185,82,8,32,1
     50,24,1579
2D   2730 DATA230,253,164,253,185
     ,82,8,240,13,72,169,1,32,165
     ,24,104,1995
D0   2740 DATA32,150,24,76,113,24
     ,173,44,12,32,165,24,96,169,
     4,32,1170
DF   2750 DATA165,24,76,83,24,170
     ,169,17,141,4,212,32,166,24,
     169,16,1492
A6   2760 DATA141,4,212,96,170,17
     3,199,15,141,104,17,169,0,14
     1,105,17,1704
39   2770 DATA173,105,17,240,251,
     202,208,237,96,120,169,9,141
     ,20,3,169,2160
1A   2780 DATA25,141,21,3,169,127
     ,141,13,220,169,1,141,105,17
     ,141,26,1460
7C   2790 DATA208,169,0,141,18,20
     8,141,110,17,169,27,141,17,2
     08,169,15,1758
61   2800 DATA141,24,212,169,0,14
     1,5,212,169,240,141,6,212,17
     3,102,17,1964
11   2810 DATA141,0,212,173,103,1
     7,141,1,212,169,16,141,4,212
     ,169,0,1711
62   2820 DATA141,192,16,141,193,
     16,88,96,173,25,208,141,25,2
     08,238,110,2011
E6   2830 DATA17,173,110,17,41,3,
     168,141,110,17,185,106,17,14
     1,18,208,1472
BC   2840 DATA173,105,17,208,8,20
     6,104,17,208,3,238,105,17,19
     2,0,240,1841
AA   2850 DATA3,76,129,234,76,49,
     234,120,169,49,141,20,3,169,
     234,141,1847
DC   2860 DATA21,3,169,129,141,13
     ,220,169,0,141,26,208,169,15
     ,141,25,1590
81   2870 DATA208,88,96,162,50,32
     ,101,25,173,18,208,48,251,32
     ,101,25,1618
14   2880 DATA202,208,242,96,173,
     18,208,201,250,144,249,96,0,
     7,51,9,2154
56   2890 DATA173,51,9,72,32,8,0,
     201,40,240,35,198,9,32,107,2
     3,1230
07   2900 DATA32,2,0,160,192,201,
     16,24,19,33,26,27,26,43,40,4
     0,881
```

Adventure Kit IV



PROGRAM: VOCAB EDITOR

```
1C   10 IFFL=1THENFL=FL+1:LOADFI$
     ,DE,1
55   20 IFFL=2THEN50
D5   30 POKE53280,0:POKE53281,0:P
     OKE646,15:POKE56,6*16:CLR
DB   40 VE=29875:NO=VE+1:AD=NO+1:
     AJ=AD+1
1C   50 PRINT"[CLR]"TAB(5)"ADVENT
     URE KIT VOCABULARY EDITOR"
AF   60 PRINT"[DOWN2]"TAB(11)"1.
     EDIT NOUNS"
0A   70 PRINT"[DOWN]"TAB(11)"2. E
     DIT VERBS"
BE   80 PRINT"[DOWN]"TAB(11)"3. E
     DIT ADVERBS"
E8   90 PRINT"[DOWN]"TAB(11)"4. E
     DIT ADJECTIVES"
75   100 PRINT"[DOWN]"TAB(11)"5.
     SAVE TABLES"
55   110 PRINT"[DOWN]"TAB(11)"6.
     LOAD TABLES"
5A   120 PRINT"[DOWN]"TAB(11)"7.
     TEST TABLES"
B0   130 GET I$:IFI$<"1"ORI$>"7"T
     HEN130
18   140 ON VAL(I$)GOTO150,160,17
     0,180,230,190,590
7F   150 TA=30976:TL=NO:T$="NOUN"
     :LL=1024:GOTO330
02   160 TA=29952:TL=VE:T$="VERB"
     :LL=1024:GOTO330
69   170 TA=32000:TL=AD:T$="ADVER
     B":LL=256:GOTO330
59   180 TA=32256:TL=AJ:T$="ADJEC
     TIVE":LL=256:GOTO330
0F   190 INPUT "[CLR]INPUT FILE N
     AME";FI$
C7   200 INPUT"[DOWN]DEVICE (8=DI
     SK...1=CASSETTE)";DE
FD   210 PRINT"[DOWN3]LOADING TAB
     LES ......."
A9   220 FL=1:GOTO10
93   230 RESTORE:FOR I=870TO924:R
     EADX:POKEI,X:T=T+X:NEXT
D5   240 IF T<>5940 THEN PRINT"DA
     TA ERROR": END
03   250 INPUT "[CLR]INPUT FILE N
     AME";FI$
AA   260 INPUT"[DOWN]DEVICE (8=DI
     SK...1=CASSETTE)";DE
58   270 PRINT"[DOWN3]SAVING TABL
     ES ......."
B2   280 SYS 870 FI$,DE,2,29875,3
     2767
2F   290 GOTO 50
E2   300 DATA 32,212,225,32,253,1
     74,32,138,173,32,247,183,165
     ,20,72,165,21,72,32,253
6D   310 DATA 174,32,138,173,32,2
     47,183,165,1,41,254,133,1,16
     6,20,164,21,104,133,21
24   320 DATA 104,133,20,169,20,3
     2,95,225,165,1,9,1,133,1,96
D4   330 PRINT"[CLR]"TAB(12)"EDIT
      "T$" TABLE"
24   340 PRINT"[DOWN]THERE ARE"PE
     EK(TL)T$"S ENTERED"
E0   350 PRINT"[DOWN3]"TAB(10)"1.
      VIEW "T$" TABLE"
5B   360 PRINT"[DOWN]"TAB(10)"2.
     ADD "T$"
DF   370 PRINT"[DOWN]"TAB(10)"3.
     CLEAR "T$"S"
22   380 PRINT"[DOWN]"TAB(10)"4.
     REMOVE "T$
C9   390 PRINT"[DOWN]"TAB(10)"5.
     MAIN MENU"
C3   400 GETI$:IFI$<"1"ORI$>"5"TH
     EN400
59   410 ON VAL(I$) GOTO 420,510,
     570,550,50
60   420 IF PEEK(TL)=0THEN330
45   430 PRINT"[CLR]":C=0:FORJ=1T
     OPEEK(TL)
97   440 PRINTTAB(17)J;: FORL=1TO
     4:PRINTCHR$(PEEK(TA+(J-1)*4+
     L-1));:NEXT:     PRINT
24   450 C=C+1: IFC<22THEN480
8A   460 GETI$:IFI$=""THEN460
60   470 PRINT"[CLR]":C=0
63   480 NEXT
C7   490 GETI$:IFI$=""THEN490
CC   500 GOTO330
E3   510 INPUT"[CLR]WORD NUMBER";
     W:INPUT"WORD";W$
9F   520 IFLEN(W$)<4THENW$=W$+CHR
     $(32):GOTO520
04   530 FORI=1TO4:POKETA+(W-1)*4
     +I-1,ASC(MID$(W$,I,1)):NEXT:
     POKETL,PEEK(TL)+1
29   540 GOTO330
75   550 INPUT"[CLR]WORD NUMBER";
     W
```

```
A6  560 FORI=1TO4:POKETA+(W-1)*4
    +I-1,32:NEXT:POKETL,PEEK(TL)
    -1:GOTO330
DA  570 POKETL,0:FORQ=1TOLL:POKE
    (TA-1)+Q,32:NEXT:GOTO330
30  580 SYS7*4096:PRINTPEEK(897)

BE  590 PRINT"[CLR]":SYS7*4096
F0  600 IF PEEK(897)=255THEN PRI
    NT"[HOME]ERROR IN TEXT":FORI
    =1TO500:NEXT:GOTO590
56  610 PRINT"[HOME]VERB:[SPC5]"
    PEEK(880)
56  620 PRINT"[DOWN]ADVERB:[SPC3
    ]"PEEK(881)
5D  630 PRINT"[DOWN]ADJ  1:[SPC3
    ]"PEEK(882)
71  640 PRINT"[DOWN]NOUN 1:[SPC3
    ]"PEEK(883)
6E  650 PRINT"[DOWN]ADJ 2 :[SPC3
    ]"PEEK(884)
02  660 PRINT"[DOWN]NOUN 2:[SPC3
    ]"PEEK(885)
F2  670 PRINT"[DOWN]WITH:[SPC5]"
    ;PEEK(886)
90  680 PRINT"[DOWN]TO   :[SPC5]"
    ;PEEK(887)
C5  690 T$="":IFPEEK(896)>0THEN
    FORI=0TOPEEK(896)-1:T$=T$+CH
    R$(PEEK(49920+I)):NEXT
69  700 PRINT"[DOWN]TEXT:[SPC5]"
    T$
36  710 PRINT"[DOWN2]PRESS ← TO
    EXIT ELSE ANY KEY"
10  720 GETI$:IFI$=""THEN720
FD  730 IFI$="←"THEN50
CD  740 GOTO590
```

PROGRAM: PARSER LOADER

```
85  10 REM*********************
    **
BE  20 REM* ADVENTURE KIT PART 4
    *
AE  30 REM*     PARSER MODULE
    *
B7  40 REM*********************
    **
11  2000 FORL=0TO75:CX=0:FORD=0T
    O15:READA:CX=CX+A:POKE28672+
    L*16+D,A:NEXTD
82  2010 READA:IFA<>CXTHENPRINT"
    ERROR IN LINE";2040+(L*10):S
    TOP
0F  2020 NEXTL:END
DF  2040 DATA32,34,112,173,115,3
    ,141,130,3,173,120,3,13,121,
    3,13,1189
74  2050 DATA122,3,13,123,3,13,1
    24,3,13,125,3,13,126,3,141,1
    29,957
3A  2060 DATA3,96,160,0,169,9,32
    ,210,255,169,0,141,160,195,1
    41,161,1901
38  2070 DATA195,162,22,160,0,24
    ,32,240,255,160,0,32,207,255
    ,201,13,1958
B0  2080 DATA240,6,153,80,195,20
    0,208,243,140,161,195,169,25
    5,141,162,195,2743
FD  2090 DATA173,162,195,208,1,9
    6,160,0,140,112,3,140,113,3,
    140,114,1760
3E  2100 DATA3,140,116,3,140,115
    ,3,140,117,3,140,118,3,140,1
    19,3,1303
23  2110 DATA140,120,3,140,121,3
    ,140,122,3,140,123,3,140,124
    ,3,140,1465
BC  2120 DATA125,3,140,126,3,140
    ,160,195,140,128,3,140,127,3
    ,160,0,1593
07  2130 DATA140,165,195,172,165
    ,195,140,127,3,32,175,115,32
    ,149,115,32,1952
8F  2140 DATA190,115,173,163,195
    ,240,6,238,165,195,76,147,11
    2,32,19,116,2182
B5  2150 DATA173,163,195,48,6,16
    9,255,141,120,3,96,238,166,1
    95,173,166,2307
97  2160 DATA195,141,112,3,173,1
    65,195,205,161,195,208,1,96,
    238,165,195,2448
2B  2170 DATA173,165,195,141,127
    ,3,32,175,115,32,149,115,32,
    190,115,173,1932
B6  2180 DATA163,195,240,3,76,19
    6,112,32,37,116,173,163,195,
    240,12,238,2191
44  2190 DATA166,195,173,166,195
    ,141,115,3,76,84,113,32,55,1
    16,173,163,1966
51  2200 DATA195,240,12,238,166,
    195,173,166,195,141,114,3,76
    ,84,113,32,2143
21  2210 DATA73,116,173,163,195,
    240,12,238,166,195,173,166,1
    95,141,113,3,2362
B1  2220 DATA76,84,113,32,108,11
    6,173,163,195,240,8,169,1,14
    1,119,3,1741
55  2230 DATA76,84,113,32,91,116
    ,173,163,195,240,8,169,1,141
    ,118,3,1723
3F  2240 DATA76,84,113,32,125,11
    6,173,163,195,240,3,76,84,11
    3,169,255,2017
13  2250 DATA141,121,3,96,173,16
    5,195,205,161,195,208,1,96,2
    38,165,195,2358
AE  2260 DATA32,175,115,32,149,1
    15,32,190,115,173,163,195,24
    0,3,76,84,1889
6D  2270 DATA113,32,37,116,173,1
    63,195,240,12,238,166,195,17
    3,166,195,141,2355
FA  2280 DATA115,3,76,211,113,32
    ,55,116,173,163,195,240,12,2
    38,166,195,2103
7A  2290 DATA173,166,195,141,114
    ,3,76,211,113,32,91,116,173,
    163,195,240,2202
FB  2300 DATA8,169,1,141,118,3,7
    6,211,113,32,108,116,173,163
    ,195,240,1867
5D  2310 DATA8,169,1,141,119,3,7
    6,211,113,32,73,116,173,163,
    195,240,1833
79  2320 DATA12,238,166,195,173,
    166,195,141,113,3,76,211,113
    ,169,255,141,2367
77  2330 DATA122,3,96,173,165,19
    5,205,161,195,208,1,96,238,1
    65,195,173,2391
9C  2340 DATA165,195,141,127,3,3
    2,175,115,32,149,115,32,190,
    115,173,163,1922
E8  2350 DATA195,240,3,76,220,11
    3,32,91,116,173,163,195,240,
    8,169,1,2035
A3  2360 DATA141,118,3,76,126,11
    4,32,55,116,173,163,195,240,
    12,238,166,1968
33  2370 DATA195,173,166,195,141
    ,116,3,76,126,114,32,37,116,
    173,163,195,2021
2B  2380 DATA240,23,238,166,195,
    173,166,195,174,115,3,208,6,
    141,115,3,2161
92  2390 DATA76,126,114,141,117,
    3,76,126,114,32,108,116,173,
    163,195,240,1920
39  2400 DATA8,169,1,141,119,3,7
    6,126,114,32,91,116,173,163,
    195,240,1767
E9  2410 DATA8,169,1,141,118,3,7
    6,126,114,32,73,116,173,163,
    195,240,1748
40  2420 DATA12,238,166,195,173,
    166,195,141,113,3,76,126,114
    ,32,125,116,1991
B2  2430 DATA173,163,195,240,3,7
    6,126,114,169,255,141,123,3,
    96,173,165,2215
2F  2440 DATA195,205,161,195,208
    ,1,96,238,165,195,173,165,19
    5,141,127,3,2463
F6  2450 DATA32,175,115,32,149,1
    15,32,190,115,173,163,195,24
    0,3,76,126,1931
9A  2460 DATA114,32,55,116,173,1
    63,195,240,12,238,166,195,17
    3,166,195,141,2374
29  2470 DATA116,3,76,250,114,32
    ,37,116,173,163,195,240,12,2
    38,166,195,2126
CB  2480 DATA173,166,195,141,117
    ,3,76,250,114,32,91,116,173,
    163,195,240,2245
31  2490 DATA8,169,1,141,118,3,7
    6,250,114,32,108,116,173,163
    ,195,240,1907
97  2500 DATA8,169,1,141,119,3,7
    6,250,114,32,125,116,173,163
    ,195,240,1925
8A  2510 DATA3,76,250,114,169,25
    5,141,124,3,96,173,165,195,2
    05,161,195,2325
88  2520 DATA208,1,96,238,165,19
    5,32,175,115,32,149,115,32,1
    90,115,173,2031
32  2530 DATA163,195,240,3,76,25
    0,114,32,37,116,173,163,195,
    240,12,238,2247
2C  2540 DATA166,195,173,166,195
    ,141,117,3,76,69,115,32,55,1
    16,173,163,1955
19  2550 DATA195,240,12,238,166,
    195,173,166,195,141,116,3,76
    ,69,115,169,2269
FA  2560 DATA255,141,125,3,96,17
    3,165,195,205,161,195,208,1,
    96,238,165,2422
93  2570 DATA195,32,175,115,32,1
    49,115,32,190,115,173,163,19
    5,240,3,76,2000
B8  2580 DATA78,115,32,37,116,17
    3,163,195,240,10,238,166,195
    ,173,166,195,2292
0B  2590 DATA141,117,3,96,169,25
    5,141,126,3,96,160,0,162,0,1
    40,163,1772
F2  2600 DATA195,189,240,195,209
    ,251,208,12,200,232,204,164,
    195,208,242,169,3113
E2  2610 DATA255,141,163,195,96,
    162,0,172,165,195,185,80,195
    ,201,32,240,2477
CB  2620 DATA10,157,240,195,200,
    232,204,161,195,208,239,140,
    165,195,96,169,2806
93  2630 DATA32,141,240,195,141,
    241,195,141,242,195,141,243,
    195,96,169,207,2814
90  2640 DATA133,251,169,115,133
    ,252,169,3,141,164,195,32,12
    2,115,96,84,2174
7F  2650 DATA72,69,87,73,84,72,8
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    4,79,160,0,140,166,195,140,1
    63,195,1779
47  2660 DATA162,0,189,240,195,2
    09,251,208,12,232,200,192,4,
    208,243,169,2714
D5  2670 DATA255,141,163,195,96,
    238,166,195,173,166,195,205,
    167,195,240,244,3034
EF  2680 DATA165,251,105,4,133,2
    51,165,252,105,0,133,252,160
    ,0,162,0,2138
BD  2690 DATA76,226,115,169,0,13
    3,251,169,117,133,252,173,17
    9,116,141,167,2417
00  2700 DATA195,32,216,115,96,1
    69,0,133,251,169,121,133,252
    ,173,180,116,2351
A2  2710 DATA141,167,195,32,216,
    115,96,169,0,133,251,169,126
    ,133,252,173,2368
EB  2720 DATA182,116,141,167,195
    ,32,216,115,96,169,0,133,251
    ,169,125,133,2240
E3  2730 DATA252,173,181,116,141
    ,167,195,32,216,115,96,169,2
    10,133,251,169,2616
02  2740 DATA115,133,252,169,4,1
    41,164,195,32,122,115,96,169
    ,214,133,251,2305
5F  2750 DATA169,115,133,252,169
    ,2,141,164,195,32,122,115,96
    ,173,240,195,2313
CC  2760 DATA201,34,240,9,169,0,
    141,163,195,141,128,3,96,172
    ,127,3,1822
BD  2770 DATA200,162,0,185,80,19
    5,201,34,240,10,157,0,195,20
    0,232,204,2295
60  2780 DATA161,195,208,239,142
    ,128,3,140,165,195,238,165,1
    95,169,255,141,2739
A3  2790 DATA163,195,96,0,0,0,0,
    254,0,255,0,254,0,254,0,239,
    1710
```

Ackroyd's Saga II

PROGRAM: MAP EDITOR

```
13  1 IFFL=0THEN6
49  2 IFFL<>0THEN9
AC  3 FL=FL+1:LOADFI$,DE,1
A2  6 PRINT"[CLR]YOU MUST FIRST
    LOAD THE CODE TO BE[SPC6]ALT
    ERED. THIS WAS CALLED";
B8  7 PRINT" OBJECT.2 AND[SPC3]W
    AS GIVEN IN PART 2"
C4  8 INPUT"[DOWN]FILE NAME";FI$
    :INPUT"[DOWN]DEVICE (8=DISK,
     1=CASSETTE)";DE:GOTO3
5A  9 POKE 56,8*16:CLR
7A  10 DIM NA$(15)
22  20 GOSUB9000
2D  30 FORI=1TO15:READNA$(I):NEX
    T
B3  1000 PRINT"[CLR]"TAB(12)"CUR
    RENT POSITIONS"
30  1010 PRINT"[DOWN]"TAB(9)"X C
    OORDINATE[SPC4]Y COORDINATE"
    :PRINT
06  1020 FORI=1TO15
3E  1030 PRINTTAB(14)PEEK(34482+
    I),TAB(30)PEEK(34497+I):NEXT
    :PRINT"[HOME,DOWN3]"
5F  1040 FORI=1TO15
50  1050 PRINTI;NA$(I) :NEXT
27  1060 INPUT"[DOWN2,SPC4]SELEC
    T NASTY NO (0 TO EXIT))";NN
D6  1070 IF NN>15THEN1000
EF  1075 IFNN=0THEN2000
30  1080 PRINT"[CLR]"NA$(NN)
B6  1090 INPUT "[DOWN]X COORDINA
    TE";XC
D7  1100 IF XC>80RXC<0THEN1080
64  1110 INPUT "[DOWN]Y COORDINA
    TE";YC
C9  1120 IF YC>11ORYC<0THEN1080
05  1130 POKE 34482+NN,XC
3E  1140 POKE 34497+NN,YC
0C  1150 GOTO1000
81  2000 INPUT"[CLR]FILE NAME FO
    R SAVING";FI$
74  2010 INPUT"[DOWN]DEVICE (8=D
    ISK, 1=CASSETTE)";DE
76  2020 SYS 870 FI$,DE,2,32768,
    36175
75  2030 END
76  9000 RESTORE: FOR I=870 TO 9
    24: READ X: POKEI,X: T=T+X:N
    EXT
9E  9010 IF T<>5940 THEN PRINT"D
    ATA ERROR": END
D4  9015 RETURN
D4  9020 DATA 32,212,225,32,253,
    174,32,138,173,32,247,183,16
    5,20,72,165,21,72,32,253
F7  9030 DATA 174,32,138,173,32,
    247,183,165,1,41,254,133,1,1
    66,20,164,21,104,133,21
FA  9040 DATA 104,133,20,169,20,
    32,95,225,165,1,9,1,133,1,96

F0  10000 DATA PHOENIX,BLOB,FIRE
    ,SNAKE,CLOUD,WHIRLWIND,SOLDI
    ER,EAGLE,WIZARD
B6  10010 DATA GNOME,ZOMBIE,KEY
    1,KEY 2,KEY 3,KEY 4
```

Input Clean Up

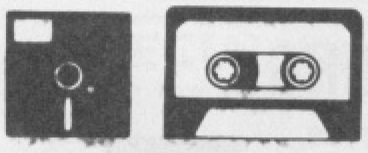
PROGRAM: INPUT LOADER

```
10 REM  * *  M/C INPUT.BAS BASIC
 LOADER  * *
20 :
30 REM      (C) KEVIN BLIGHT AUG
UST 1987
40 :
50 REM  TO ACTIVATE USE : SYS 48
64 , (MAX LENGTH OF INPUT)
52 REM  USE 'M/C INPUT READ' TO
READ INPUT IN A BASIC PROGRAM.
60 :
70 PRINT:PRINT "PLEASE WAIT - RE
ADING DATA..."
80 READ S,E : REM START AND END
ADDR
90 FOR X = S TO E-1 STEP 8
100 T=0:FOR Y=0 TO 7:READ D$: T=
T+DEC(D$):POKE Y+X,DEC(D$):NEXT
110 READ T$:IF T < > DEC(T$) THE
N PRINT "DATA ERROR... ADDR ="
;X:END
120 NEXT:PRINT:PRINT "DATA LOADE
D...":END
130 :
140 DATA 4864, 5072:REM START &
END ADDR
150 :
160 DATA 85,FA,C9,00,D0,01,60,C9
,0442 :        REM ADDR  4864
170 DATA 51,90,01,60,A9,08,20,D2
,02E8 :        REM ADDR  4872
180 DATA FF,A9,20,A2,00,9D,CC,13
,03E6 :        REM ADDR  4880
190 DATA E8,E0,50,D0,F8,A9,72,20
,051B :        REM ADDR  4888
200 DATA D2,FF,A9,9D,20,D2,FF,A2
,05AA :        REM ADDR  4896
210 DATA 01,86,FB,20,E4,FF,C9,00
,044E :        REM ADDR  4904
220 DATA F0,F9,C9,0D,F0,47,C9,22
,04E1 :        REM ADDR  4912
230 DATA F0,F1,C9,2C,F0,ED,C9,11
,058D :        REM ADDR  4920
240 DATA F0,3B,C9,91,F0,37,C9,9D
,0512 :        REM ADDR  4928
250 DATA F0,5B,C9,14,F0,57,C9,1D
,0455 :        REM ADDR  4936
260 DATA D0,02,A9,20,C9,20,90,D3
,03E7 :        REM ADDR  4944
270 DATA C9,5F,B0,CF,20,D2,FF,A6
,053E :        REM ADDR  4952
280 DATA FB,9D,CB,13,E4,FA,F0,10
,0554 :        REM ADDR  4960
290 DATA E8,86,FB,A9,72,20,D2,FF
,0575 :        REM ADDR  4968
300 DATA A9,9D,20,D2,FF,4C,2B,13
,03C1 :        REM ADDR  4976
310 DATA A6,FB,E8,86,FB,A6,FB,CA
,0675 :        REM ADDR  4984
320 DATA 48,A9,20,20,D2,FF,A9,9D
,0448 :        REM ADDR  4992
330 DATA 20,D2,FF,86,FB,68,C9,11
,04B4 :        REM ADDR  5000
340 DATA D0,05,A9,01,85,FA,60,C9
,0427 :        REM ADDR  5008
350 DATA 91,D0,05,A9,02,85,FA,60
,03F0 :        REM ADDR  5016
360 DATA A9,00,85,FA,60,A6,FB,E0
,0509 :        REM ADDR  5024
370 DATA 01,F0,80,A9,20,20,D2,FF
,042B :        REM ADDR  5032
380 DATA A9,9D,20,D2,FF,A9,9D,20
,049D :        REM ADDR  5040
390 DATA D2,FF,A9,72,20,D2,FF,A9
,0586 :        REM ADDR  5048
400 DATA 9D,20,D2,FF,A6,FB,CA,86
,057F :        REM ADDR  5056
410 DATA FB,4C,2B,13,54,48,49,53
,02BD :        REM ADDR  5064
```

PROGRAM: INPUT SAMPLE

```
10 REM  *  BASIC PROGRAM TO READ
 INPUT FROM MACHINE CODE GET INP
UT ROUTINE  *
20 SYS4864,10
30 A$="":IF PEEK(251)=0 THEN 50:
ELSE FOR XX=0 TO PEEK(251)-1
40 A=PEEK(5068+XX):A$=A$+CHR$(A)
:NEXT
50 PRINT "[";A$;"]":A%=XX
```

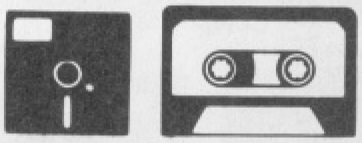
Reveal Your Character



PROGRAM: REVEAL DEMO

```
13  10 BL=18:LN=50:SA=49152
5B  20 FOR L=0 TO BL:CX=0:FOR D=
    0 TO 15:READ A:CX=CX+A:POKE
    SA+L*16+D,A:NEXT D
A5  30 READ A:IF A><CX THENPRINT
    "ERROR IN LINE";LN+(L*10):ST
    OP
86  40 NEXT L
2F  50 DATA 120,169,0,141,21,208
    ,169,41,133,251,169,4,133,25
    2,169,8,1988
87  60 DATA 133,253,169,193,133,
    254,169,0,141,253,2,169,8,14
    1,255,2,2275
C3  70 DATA 169,0,141,254,2,32,2
    43,192,169,0,162,63,157,64,3
    ,202,1853
32  80 DATA 16,250,169,13,141,24
    8,7,173,33,208,141,39,208,16
    9,127,141,2083
A3  90 DATA 13,220,173,13,220,16
    9,127,141,13,220,173,13,220,
    173,20,3,1911
A6  100 DATA 141,251,2,173,21,3,
    141,252,2,169,158,141,20,3,1
    69,192,1838
9D  110 DATA 141,21,3,173,17,208
    ,41,127,141,17,208,169,255,1
    41,18,208,1888
F2  120 DATA 32,253,192,238,254,
    2,169,255,162,8,160,0,153,64
    ,3,200,2145
10  130 DATA 200,200,202,208,247
    ,169,32,141,0,208,169,58,141
    ,1,208,169,2353
06  140 DATA 0,141,16,208,169,1,
    141,26,208,141,25,208,88,96,
    169,1,1638
B1  150 DATA 141,25,208,141,21,2
    08,173,253,2,240,26,206,253,
    2,208,64,2171
18  160 DATA 169,32,141,0,208,16
    9,0,141,16,208,32,243,192,32
    ,253,192,2028
F4  170 DATA 238,254,2,208,43,23
    8,0,208,208,3,238,16,208,206
    ,255,2,2327
37  180 DATA 208,30,169,8,141,25
    5,2,173,254,2,201,38,208,12,
    169,255,2125
BC  190 DATA 141,253,2,169,0,141
    ,254,2,240,6,32,253,192,238,
    254,2,2179
67  200 DATA 108,251,2,169,32,16
    0,37,145,251,136,16,251,96,1
    72,254,2,2082
5B  210 DATA 56,177,253,233,64,1
    45,251,96,84,72,73,83,96,115
    ,120,96,2014
6A  220 DATA 67,72,65,82,65,67,8
    4,69,82,96,77,69,83,83,65,71
    ,1197
0E  230 DATA 69,96,73,83,96,82,6
    9,86,69,65,76,69,68,0,0,0,10
    01
75  240 REM *********************
    ***********
75  250 REM *
                                 *
EF  260 REM * DEMONSTRATION OF T
    HE USE OF *
66  270 REM * A SPRITE TO REVEAL
     TEXT ON  *
31  280 REM * THE 64 SCREEN.
                                 *
5C  290 REM * THIS VERSION IS IN
     MACHINE  *
49  300 REM * CODE BUT IT COULD
    BE DONE   *
B4  310 REM * JUST AS EASILY IN
    BASIC.    *
CE  320 REM *
                                 *
7A  330 REM *********************
    ***********
E4  340 PRINT"[CLR,DOWN4,RIGHT7]
    PRESS ANY KEY TO START DEMO"
44  350 GETK$:IFK$=""THEN350
C8  360 PRINT"[CLR]":SYS 49152
```

Extended Backgrounds



PROGRAM: EXTENDED LOADER

```
1D  10 REM **** EXTENDED BACKGRO
    UNDS ****
D5  100 DATA76,7,192,76,53,192,0
    ,120,716
43  110 DATA169,76,162,192,141,2
    0,3,142,905
84  120 DATA21,3,169,50,141,18,2
    08,173,783
71  130 DATA17,208,41,127,141,17
    ,208,169,928
72  140 DATA129,141,25,208,169,2
    41,141,26,1080
91  150 DATA208,169,127,141,13,2
    20,169,255,1302
6D  160 DATA141,6,192,88,96,120,
    169,49,861
A4  170 DATA162,234,141,20,3,142
    ,21,3,726
A5  180 DATA169,0,141,26,208,169
    ,129,141,983
08  190 DATA13,220,88,96,169,129
    ,141,25,881
81  200 DATA208,238,6,192,174,6,
    192,224,1240
17  210 DATA25,176,18,189,64,3,1
    41,33,649
5A  220 DATA208,189,122,192,141,
    18,208,104,1182
3F  230 DATA168,104,170,104,64,1
    62,255,142,1169
A0  240 DATA6,192,169,50,141,18,
    208,76,860
D2  250 DATA49,234,58,66,74,82,9
    0,98,751
60  260 DATA106,114,122,130,138,
    146,154,162,1072
39  270 DATA170,178,186,194,202,
    210,218,226,1584
3E  280 DATA234,242,250,255,255,
    255,255,251,1997
D9  290 L=100:FORI=49152TO493035
    TEP8
4D  300 ZZ=0:FORJ=0TO7:READZ:ZZ=
    ZZ+Z:POKEI+J,Z:NEXTJ:READZ
6B  310 IFZ<>ZZTHENPRINT"DATA ER
    ROR IN LINE"L:END
DB  320 L=L+10:NEXTI:END
```

PROGRAM: EXTENDED DEMO

```
82  100 REM SET INITIAL BACKGROU
    ND COLOURS
E4  110 FORI=0TO24:READJ:POKE832
    +I,J:NEXT
5F  120 SYS49152:REM ENABLE ROUT
    INE
4A  130 POKE53280,0:REM SET BORD
    ER COLOUR
24  140 PRINT"[CLR,DOWN,CYAN,SPC
    5]THIS IS A DEMONSTRATION SC
    REEN
BE  150 PRINT"[DOWN,PURPLE]  SHO
    WING HOW YOU CAN HAVE A DIFF
    ERENT
9C  160 PRINT"[DOWN,GREEN,SPC7]B
    ACKGROUND COLOUR FOR EACH
B5  170 PRINT"[DOWN,YELLOW,SPC6]
    CHARACTER LINE ON THE SCREEN

62  180 PRINT"[DOWN3,C1,SPC3]AS
    WELL AS A DIFFERENT FOREGROU
    ND
04  190 PRINT"[DOWN,C3,SPC3]COLO
    UR FOR EACH  CHARACTER SQUAR
    E
A4  200 PRINT"[DOWN3,SPC7,BLACK]
    W[WHITE]R[BLACK]I[WHITE]T[BL
    ACK]T[WHITE]E[BLACK]N[WHITE]
     [BLACK]B[WHITE]Y[BLACK] [WH
    ITE] [BLACK]P[WHITE]A[BLACK]
    U[WHITE]L[BLACK] [WHITE]W[BL
    ACK]I[WHITE]L[BLACK]L[WHITE]
    I[BLACK]A[WHITE]M[BLACK]S
7C  210 PRINT"[DOWN]
03  220 A$="[BLACK,C+,WHITE,C+,R
    ED,C+,CYAN,C+,PURPLE,C+,GREE
    N,C+,BLUE,C+,YELLOW,C+,C1,C+
    ,C2,C+,C3,C+,C4,C+,C5,C+,C6,
    C+,C7,C+,C8,C+]"
E9  230 PRINT"  "A$"[SPC3]"A$
AC  240 PRINT"  "A$"[SPC3]"A$"[Y
    ELLOW]";
E3  250 FORI=1TO5000:NEXT:REM PA
    USE
EA  260 C=0:FORI=1TO500:REM CYCL
    E COLOURS
F8  270 POKE832+RND(1)*25,C
85  280 C=C+1:IFC=16THENC=0
A1  290 NEXT
E6  300 SYS49155:REM DISABLE ROU
    TINE
A4  310 PRINT"[CLR]";:POKE53281,
    0:END
10  320 DATA6,6,2,2,13,13,5,5,5,
    9,9,9,11,11,11
4A  330 DATA11,8,8,8,12,11,12,11
    ,8,8
```

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B R E A K

OOPS!

A number of gremlins have appeared in the *Your Commodore* works over the last few months. This is the page where we come clean and give you the latest updates where needed.

Disk Users Handbook

A number of people are reporting errors in some of the programs in this supplement. Again there are no problems in the programs as published. However, should you be getting a SYNTAX ERROR after you have entered the POKEs given in the instructions you will find details here of how to get around this.

The POKEs to memory locations 43 and 44 are moving the start of Basic to a new area of memory. The new start of Basic can be worked out by the simple equation:
(No. Poked in 43)+(256*No. Poked in 44)

The previous memory location to the start of Basic must always contain the number '0'. Should a zero not be present here then you will get a SYNTAX ERROR after entering the NEW instruction. Modifying the POKE instructions to the following will allow you to use the programs correctly:

1541 Fast Loader
POKE43,0:POKE44,16:POKE4095, 0: NEW

Menu Maker
POKE43,0:POKE44,18:POKE4607, 0:NEW

December 1987

The mad knifeman seems to have got hold of the Budget Calc program somewhere in the production of this article. A number of lines need additions/alterations in order to get this program working correctly.

BUDGET CALC
1640 should have 13 cursor rights not 10
3580 the GO on the end should be GOTO 2600
3060 IFM$(T)="0"THENHM$(T) ="[RIGHT]0000":GOTO 3110

BUDGET REVIEW
1640
PRINT "[RIGHT5,CM,SPC6,CM, SPC6,CM,SPC6,CM]"

Serious Users Guide

A number of people have reported problems with the Plus/4 Transcript program. It appears that a couple of data lines were corrupted in our listing. Please find the correct lines here. If you have typed in the transcript program all that you have to do to enter the corrections is enter the monitor and use the M command to modify the incorrect portion of code (see your manual for details).

```
1201 20 BA FF A9 00 20 BD FF:
1209 20 C0 FF A2 0F 20 C6 FF
1211 20 CF FF C9 30 D0 11 20:
```

A number of people have reported having problems with the Multifile program. To our knowledge there are no errors in this as printed. It appears, from copies of this returned to the office, that many people are trying to RUN this program without reference to the program instructions. You MUST set up a number of program lines yourself BEFORE you attempt to run the program otherwise you will get a SYNTAX ERROR.

The first line that is giving people problems is number 500 in MULTIFILE. Of course this line will give you a SYNTAX error, F=*** is an incorrect statement. Refering to the listing and the instructions you will see that F should hold the number of fields. Let's say you wanted 10 fields, line 500 would become:
500 F=10:REM * NUMBER OF FIELDS

There are many other lines that need setting up in the same way.

Program Submissions

Due to the illness of our software evaluator some people may be experiencing a delay in getting to replies regarding submissions. We are trying to clear the backlog of programs as quickly as we can but this is taking some time. This backlog also effects Bug Finders and Lifesavers.

We apologise for the delay and would ask that you would bear with us while the backlog is cleared.

The publication of lifesavers has also been halted because of this software backlog. We will be bringing you more short programs and tips as soon as we can.

January 1988

A number of people are experiencing problems sorting out exactly which listing goes with which article. This was caused by the ommission of the program headings from the listing pages. Here is a full list of each article and their programs.

C64 Tape System –	TIMER (77) SPOOLER (77)
Ackroyd's Saga –	Loader.1 (78) Loader.2 (79) Loader.3 (81) Loader.4 (82) Loader.4 (82) Loader.5 (83) Loader.6 (86) Code Saver(88) Ackroyds Saga (89)
Enlarging the C64 –	Program 1 (89) Program 2 (90)
Array Display Sub-routines –	Array Loader (90) Array Defs (91)
Sprite Library–	Vehicles. Data (92) Vehicles. Display (95)
80 Character Printout –	ROM80.BAS (95)
Question-naire 1	BOOT (96) Questionnaire 1 (96)
May I Interrupt? –	Listing 1 (99) Listing 2 (100) Listing 3 (100) Listing 4 (101)
Byting Into the 6510 –	Cursor Rt's (101) Typewriter Rt (101)

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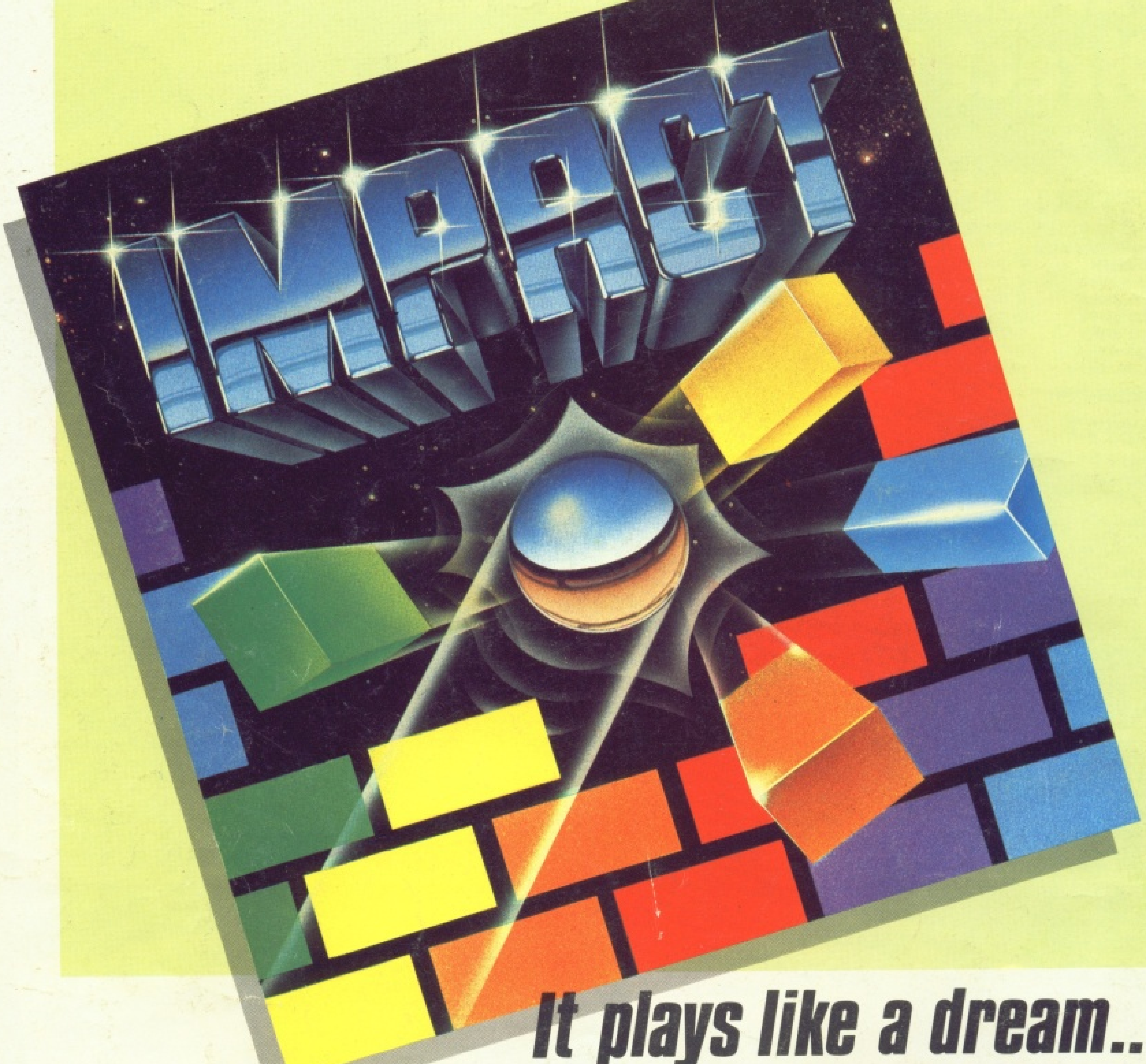
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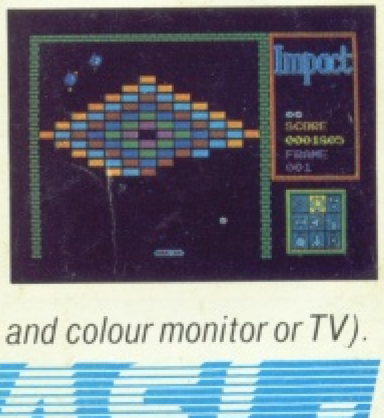
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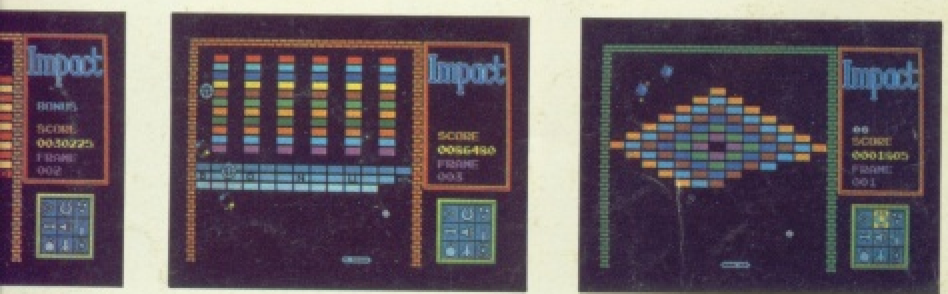
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